Science Budget

2003–04 to 2005–06

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Department of Trade and Industry

Office of Science and Technology

Foreword by the Secretary of State for Trade and Industry

I am delighted to present the Science Budget allocations for 2003–04 to 2005–06. They reflect the excellent outcome for science that the Government announced as part of the Spending Review in July this year. This outcome includes substantial new investments in science research, science capital infrastructure, people in the science and engineering base and in knowledge transfer. As a result of this new investment, the rate of growth of the Science Budget will accelerate from an average of 7 per cent year-on-year to 10 per cent in real terms.

Scientific research is vital for economic prosperity. The allocations set out in this document are therefore excellent news not only for UK science but also for business.

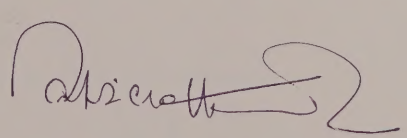
Our investment will generate new knowledge and new technologies. It will produce highly trained people whose skills and capabilities are vital not only within universities but also in business. And it will help those who work in the science and engineering base to exploit the fruits of their research for the benefit of all.

The highlight of the allocations is the establishment of a series of new and exciting multi-disciplinary research programmes which have great potential for increasing prosperity for all, for enhancing people's quality of life, and for benefiting society as a whole by, for example, improving the environment. There are described in Chapter 6.

But it is important that we do not neglect our core science, engineering and technology disciplines while we forge ahead in new areas. I am therefore delighted to be able to allocate new funding to the Research Councils to enable them to ensure that the foundations of our excellent science, engineering and technology base remain as strong as ever.

In his keynote speech "Science Matters", delivered at the Royal Society in May this year, the Prime Minister commented, *"Scientific discovery is one of the most exciting developments happening in the world today… But we have relied for too long on tradition and sentiment to aid our scientists. We need strong funding and public support…"*

The spending review outcome for science and these allocations show that, where science is concerned, this Government means business.



Rt. Hon. Patricia Hewitt, MP

Contents

1. Introduction and summary

This booklet provides an account of the Government's plans for the Science Budget for the period 2003–04 to 2005–06 following the announcement in July 2002 of the Government's spending plans for this period. The allocations described reflect advice given to the Secretary of State by the Director General of Research Councils, who reports to the Secretary of State on all matters relating to the Science Budget.

This chapter summarises:

- the outcome of the spending review for the Science Budget and the resources available over the period 2003–04 to 2005–06;
- the main actions which were set out in *Investing in Innovation*[1], the Government's strategy for science, engineering and technology, and how these relate to the allocations described later in this booklet;
- the Science Budget spending plans, including those parts of the Science Budget that are being allocated at the time of publication and those that will be allocated by different processes and on different timescales.

Chapter 2 sets out the overarching framework within which the Science Budget is managed. This comprises the strategic aims of the Government's science and innovation policies; the related top-level objectives for the Science Budget; and the approach to managing delivery from Science Budget expenditure.

Chapter 3 briefly describes the Government's programme of action to address the problem of the sustainability of the university research base. It concentrates on those aspects of this work which will be directly funded through the Science Budget – funding for university science research infrastructure and plans to reform the Dual Support system using additional funding from 2005–06.

Chapter 4 looks at the increases in funding for Knowledge Transfer through the Higher Education Innovation Fund and for a second round of funding for the exploitation of research outputs in Public Sector Research Establishments.

Chapter 5 describes the funding that has been made available through the Science Budget to fund the recommendations of the Roberts Review, *SET for success*[2] and the way in which some elements of it are being allocated to the Research Councils.

Chapter 6 is the central chapter in this booklet. It describes in some detail how the funding for new science made available in the spending review will be used. It describes three new headline research programmes and the allocations to each of the Research Councils and to the Royal Society and the Royal

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[1] *Investing in Innovation: A strategy for science, engineering and technology;* July 2002, http://www.hm-treasury.gov.uk/

[2] *SET for Success – Final Report of Sir Gareth Roberts' Review*; April 2002, http://www.hm-treasury.gov.uk/

Academy of Engineering. It describes the purposes to which this funding will be put and how this will contribute to the achievement of the strategic objectives for the Science Budget which are described in Chapter 2.

Chapter 7 describes how capital funding will be allocated to investments in large facilities, including the Diamond synchrotron, and to renewal and development of the Research Councils' institutes, centres and surveys which form a crucial part of the science and engineering base. This investment is driven by, and complements, the investments being made by the Councils, collectively and individually, in the science that underpins their own missions.

Finally, Chapter 8 provides information about the small proportion of the Science Budget which is held and managed centrally by the Office of Science and Technology (OST).

Spending review 2002

The spending review (SR2002) outcome for the Science Budget once again demonstrated the Government's commitment to science and its belief that investment in science yields a wide range of benefits for the nation and a high rate of economic and social return. As a result of the previous spending review the Science Budget is growing at an average rate of 7% year-on-year in real terms. This spending review accelerates that growth to 10% from 2003–04 onwards. By 2005–06, the Science Budget will reach just short of £3 billion – more than double the figure in 1997–98.

Investing In Innovation

The outcome of the spending review for the Science Budget reflects the recommendations of the Government's Cross-Cutting Review of Science and Research. This review was carried out, under the leadership of Lord Sainsbury, by HM Treasury, DTI and the Department for Education and Skills (DfES)[3] and reported to Ministers in spring 2002. Immediately following the announcement of the spending review, the Government published *Investing in Innovation*, its strategy for science, engineering and technology. *Investing in Innovation* builds directly upon many of the recommendations of the Cross-Cutting Review. Among the announcements in *Investing in Innovation* were a series of funding and policy commitments in four broad areas of work relevant to the Science Budget, namely:

- measures to put UK university research on a long-term sustainable footing;
- funding to allow the volume of UK basic research to continue to grow;
- measures to address the issues relating to PhD stipends and postdoctoral research salaries, training and careers as described in *SET for success*; and
- increased funding to further improve the exploitation of the knowledge and technologies generated by research in the science and engineering base.

In addition to its domestic impact, this outcome will help the UK to remain globally competitive and will allow our scientists to shape and participate in European and worldwide scientific activities. It will ensure that the UK remains an attractive place to do science.

[3] *Cross Cutting Review of Science and Research*, March 2002 http://www.hm-treasury.gov.uk/

The new additions to the Science Budget are summarised in table 1[4].

Table 1: The additions to the Science Budget for the period 2003–04 to 2005–06

£ million	Outturn	Plans	Baseline	SR2002 Additions		
	2001–02	2002–03	2003–04	2003–04	2004–05	2005–06
Resources:	**1868**	**1988**	**2236**(1)	**+10**	**+222**	**+555**
Science and Engineering Research(1) (*see also capital, below*)	1708	1819	1922	0	+116	+255
University research sustainability	0	0	0	0	0	+120
Capital grants to HEIs for science research infrastructure	125	125	250	0	+50	+50
Roberts Review recommendations	0	0	0	+10	+40	+100
Knowledge Transfer						
of which:	35	44	64	0	+16	+30
• *HEIF*			*50*	*0*	*+11*	*+20*
• *CMI*			*14*	*0*	*0*	*0*
• *PSRE Fund*			*0*	*0*	*+5*	*+10*
Capital	**74**	**104**	**100**	**+31**	**+107**	**+105**
Diamond, LFs and RC institutes				+31	+87	+60
Science and Engineering Research				0	+20	+45
Total	**1942**	**2092**	**2336**	**2377**	**2665**	**2996**

(1) This does not include the £17.9 million transfer into the Science Budget in relation to nuclear fusion. See Appendix for further details.

[4] This table, and all others in this booklet, show expenditure figures for resource and capital separately, reflecting the Government financial framework for resource budgeting that comes into force from April 2003. Further information about Resource Accounting and Budgeting may be found at http://www.hm-treasury.gov.uk/. Further information is also provided in the Appendix to this booklet.

Table 2: The Science Budget 2003–04 to 2005–06

	Resource				Capital			
	Baseline	Additions to baseline			Baseline	Additions to baseline		
£ million	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004–05	2005–06
MRC[1]	414.838	0.480	19.770	58.160	14.557	–	8.915	15.195
BBSRC	267.272	0.580	17.155	53.935	-2.820[2]	–	6.265	10.810
NERC[1]	256.162	0.420	10.105	31.530	7.520	–	6.450	9.985
EPSRC: *of which*	463.569	4.560	22.390	70.395	0.395	–	5.360	12.070
Cross-Council core programmes	*37.000*	–	*–1.500*	*6.200*	–	–	–	–
PPARC	248.780	0.190	10.210	25.220	1.800	–	5.680	9.440
ESRC	93.584	0.400	8.710	23.030	0.600	–	1.180	2.650
CLRC[1]	91.299	7.630	15.100	19.350	20.089	–	3.000	3.000
RC Pension Scheme	29.740	–	1.400	3.500	–	–	–	–
Royal Society	29.245	–	1.800	3.200	–	–	–	–
Royal Academy of Engineering	5.270	–	0.330	0.580	–	–	–	–
Roberts Review (unallocated)	–	6.000	18.020	49.310	–	–	–	–
University research sustainability	–	–	–	115.460	–	–	–	–
SRIF/University research capital	250.000	–	46.570	50.000	–	–	–	–
Diamond	3.561	1.800	4.720	6.890	20.000	19.300	55.800	30.500
Large Facilities & RC Institutes unallocated	5.000	–	–	–	45.000	2.500	18.550	11.350
Higher Education Innovation Fund	50.000	–	10.305	19.425	–	–	–	–
PSRE Fund	–	–	4.655	9.715	–	–	–	–
CMI	14.000	–	–	–	–	–	–	–
OST managed funds	24.364	12.000	22.000	22.000	–	–	–	–
Total	**2246.384**	**34.060**	**213.240**	**561.700**	**107.141**	**21.800**	**116.200**	**105.000**
Re-phasing of existing Science Budget programmes		*24.060*	*-8.760*	*6.700*		*-9.200*	*9.200*	–
TOTAL	**2246.384**	**10.000**	**222.000**	**555.000**	**107.141**	**31.000**	**107.000**	**105.000**

(1) These figures include the element of Councils' baselines set aside to provide public expenditure cover for EU receipts. Tables shown in Chapter 6 exclude this component.

(2) Negative figure results from planned disposal in that year.

2. Science Budget Objectives 2003–04 to 2005–06

The Government's Science and Innovation Strategy

The Government's policies for investment in science, technology and innovation[5], aim to achieve a range of benefits both economically, in terms of wealth creation and increased productivity, and more widely across society by contributing to improvements in areas such as the nation's health, environment and quality of life.

The success of its policies for both the creation and use of science and technology relies on the continuing health and sustained renewal of the nation's science and engineering base[6]. Public investment in this base not only generates essential raw material for innovation – new ideas, knowledge, understanding, solutions, techniques, processes, technology – but also the highly educated people that can both exploit this raw material and more generally contribute to the development of new businesses, products and services (public and private) for the country and its people.

Over the period from 2003–04 to 2005–06 the Government's strategies focus on:

- sustainable renewal and growth of the underpinning science and engineering base;
- building up the nation's innovation performance, capabilities and systems;
- strengthening the use of science and management of research by Government Departments;
- improving the public's trust in the conduct of publicly funded research and their confidence in its use and management by Government.

The Contribution of the Science Budget to Government Strategy

There are four key areas where the results of investment from the Science Budget deliver output directly relevant to this wider government strategy for science and innovation.

Research: as part of the Dual Support system for research, involving the Office of Science and Technology (OST), the DfES and the Funding and Research Councils, the investment made by OST through distribution of the Science Budget is focused on ensuring that the science and engineering base produces outputs that are:

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[5] *Investing in Innovation: A strategy for science, engineering and technology;* July 2002. *Excellence and Opportunity: a science and innovation policy for the 21st century;* Cm 4814, July 2000.

[6] The science, engineering and technology base comprises the research and postgraduate training capacity of higher education institutions and the institutes, centres and surveys operated by the Research Councils, together with the central facilities in the UK and overseas that are available for use by UK-based researchers through funding from the Councils: *Realising our potential: a strategy for science, engineering and technology;* Cm 2250, May 1993.

- of **the highest quality** with respect to world class benchmarks;
- **relevant** to the needs of potential users and the nation;
- **timely** – that is made available when they can generate the greatest potential benefit or competitive advantage for users.

OST's strategy is also aimed at building and sustaining research capability and capacity in the existing and emerging fields that are likely to be the most important, now and for the foreseeable future.

Training: in addition to supporting the production of the new knowledge that comes from research, funding from the Science Budget also delivers the supply of highly trained scientists, engineers, and technologists with postgraduate and higher qualifications that are essential to the continuing development of the science and engineering base itself and to modern and successful business and public services.

Knowledge Transfer: the full value of the knowledge created by the science and engineering base can only truly be released when it is put to use. So, the Science Budget also contributes to innovation more widely by investing in a targeted set of programmes that increase the ability of the science and engineering base to engage successfully in knowledge transfer activities, reaching out into business and to the other users through which ideas, knowledge and technology are exploited.

Science in Society: additionally, to ensure that the outputs from its funding are understood by and developed in ways that are acceptable to society at large, the Science Budget supports programmes to raise public awareness of, and engagement with, science and to promote public dialogue on the issues that are raised by scientific advances.

In these ways, public investment from the Science Budget contributes to the delivery of the Department of Trade and Industry's PSA target for science and innovation, post spending review 2002, namely:

To improve the relative international performance of the UK's science and engineering base, exploitation of the science base and the overall innovation performance of the UK.

Managing Delivery from the Science Budget

The OST works through and with a number of other bodies to deliver these outputs and outcomes from Science Budget investment. It also manages a small number of programmes itself.

The primary delivery organisations that receive funding from OST are the UK's seven Research Councils, the Royal Society, and the Royal Academy of Engineering.

Alongside the allocation of funding from the Science Budget to these bodies, there is an associated delegation of responsibility and accountability for their role in delivering the Government's strategy and the supporting strategic objectives. These strategic objectives describe what should be achieved, in output or outcome terms, with the funds provided.

In the case of the Research Councils, OST also sets operational objectives to ensure that they deliver in ways that are economic, efficient and effective, as well as complying with wider Government policies relating to non departmental public bodies (NDPBs) and the modernisation of public services.

A key new mechanism for supporting this agenda is Research Councils UK (RCUK). Launched in May 2002, RCUK is a strategic partnership between the seven UK Research Councils through which they are working together to improve the impact of their activities and investments.

Science Budget Strategic Objectives

During the period 2003–04 to 2005–06, the Research Councils, both individually and collectively, other funded bodies and the OST will use their allocations from the Science Budget to work towards delivering a set of strategic objectives in the four key areas described above: research, training, knowledge transfer, and science and society.

As recommended by the Quinquennial Review of the Research Councils, RCUK will also develop a long-term vision for science that will support future delivery against these objectives.

Research Objectives

RO1. To continue to improve the excellence, relevance and impact of the knowledge created from Research Council-funded programmes.

The Science Budget, via the activities of the Research Councils, will continue to support a diverse portfolio of top-quality basic, strategic and applied research in Higher Education Institutions (HEIs) and Research Council-owned institutes, centres and surveys. The increase in funding available for this underpinning research in SR2002 will be used to deliver increases in both volume and quality of output. The individual strategies developed by the Research Councils to deliver against this objective, and the supporting funding mechanisms that they promote, will also focus on increasing the relevance and impact of the results of this research on society and the economy.

RO2. To increase research capability and international competitiveness of the UK in new strategic areas.

The Research Councils, and their communities, have identified new areas of high priority research where the UK needs to make a major focused investment now if it is to establish a competitive position internationally. Additional funding will be used to deliver both enhanced research capability in these areas and increased research output, in terms of volume, excellence and impact.

RO3. To increase the dynamism and flexibility of Research Council programmes to respond to changing requirements and opportunities, and to support effectively multi-disciplinary research, new researchers and higher risk research proposals.

The Research Councils will continue regularly to recycle a proportion of their core funding into new high priority programme areas in their portfolios. They will also continue to develop and exercise appropriate mechanisms to encourage excellent new researchers and support an appropriate proportion of higher risk research. Working together, the Research Councils will continue to develop strategies for promoting and supporting multi-disciplinary and interdisciplinary research.

RO4. To maintain access for scientists working in the UK to the necessary major facilities, databases and supporting laboratory infrastructure that will enable them to deliver world-class research.

To remain internationally competitive in the performance of world-class science, continuing investment is necessary in a range of major facilities and instruments, databases and supporting infrastructure that scientists require to pursue their research. OST will continue to work with the Research Councils to develop and publish a further version of the large facilities road-map setting out priorities for investment in these high-value strategic assets. The Research Councils will contribute to funding those projects in the road-map that are of most strategic value to their research communities from their budgets. They will also continue to invest in the capital infrastructure of their owned institutes, centres, and surveys, and ensure that there are plans in place for maintaining the competitiveness of this element of the science and engineering base infrastructure. In addition, OST will continue to work with and through the Higher Education Funding Council for England (HEFCE) and others to ensure that monies in the Science Research Investment Fund (SRIF) are used to develop and maintain state-of-the-art laboratories and equipment in universities which complement to a suitable degree the strategic intentions of the Research Councils and other funders of the science and engineering base.

The Government announced in the recent spending review a new dedicated capital stream for science research infrastructure in universities. It will build up from £400 million in 2003–04 to £500 million per year in 2004–05 and beyond. As with SRIF, this funding stream will be allocated on a formula basis relating to research excellence and volume. The new funding stream will be aimed primarily at renewing the research infrastructure through refurbishments and replacements. A small element of the new capital stream will be retained centrally to support strategic rationalisation and restructuring of the university science base, including mergers.

Training Objectives

TO1: To raise the standard of postgraduate and postdoctoral researchers, and increase their numbers in priority fields experiencing shortfalls or recruitment difficulties.

TO2: To enhance their training to better fit them for careers requiring research skills and experience and increase their attractiveness to future employers.

Research Councils will raise minimum stipends and pay for PhD students and postdoctoral researchers respectively. Beyond this, they will target further increases in remuneration at fields experiencing shortfalls or recruitment difficulties, and increase the funding to HEIs to enhance the training available to PhD students and postdoctoral researchers. Other training funded through the Science Budget, e.g. through the Royal Society and the Royal Academy of Engineering, will be developed along similar lines, and the overall number of postdoctoral fellowships supported will be increased.

One of the main themes from the Roberts' Review was the need for funders of research to concentrate on the continuous professional development of postgraduate students and researchers, particularly in transferable skills that are essential for innovation in business and research, for example, project management, presentational skills and business planning. There will also be a need for the funders of research to work together to understand better the market forces that affect the supply of engineers and scientists and, therefore, enable resources to be aimed at those disciplines in greatest need.

Knowledge Transfer Objectives

KTO1: To increase the performance of the science and engineering base in exploiting the results of its research.

There are many different sources of public funding available to HEIs both to encourage them to transfer their knowledge and to support them in developing the skills they need to be successful in its exploitation. The Science Budget contributes to this effort both directly through the Higher Education Innovation Fund (HEIF) and via the efforts of the Research Councils. The Research Councils will continue to promote knowledge transfer across the whole range of their portfolios and, where appropriate, work with partners to support schemes such as Faraday Partnerships, CASE awards and LINK programmes. OST will work with and through HEFCE to ensure that HEIF continues to complement this Research Council work and delivers the objectives set out for it in *Investing In Innovation.*

KTO2: To increase the effectiveness of knowledge transfer from Research Council institutes in line with the recommendations of the Baker review of public sector research establishments[7] *and the NAO report on commercialisation of public sector science*[8].

In contrast to grantholders at universities, the Research Councils have a more direct relationship with their institutes. Governance regimes vary but in many cases the Research Council is both the major funder of the work undertaken by the institute and also its owner (or part owner) and is therefore accountable for its performance across the board. Research Councils will continue to implement the recommendations of the Baker review and address the issues of good practice raised in the NAO report.

Science in Society Objectives

SSO1: To enhance public awareness of the outcomes from and priorities for publicly funded science and increase openness over its management and use through greater engagement and dialogue with the public.

SSO2: To increase the reach and impact of activities undertaken by the Research Councils and other bodies funded through the Science Budget by improving joint working between them and other organisations.

Further information on Science in Society aims and initiatives are to be found in Chapters 2 and 8.

Operational Objectives

In addition to these strategic objectives for the Research Councils and other bodies funded through the Science Budget, the Research Councils will also address three high level operational objectives during this period.

OO1. To complete work on implementation of the recommendations of the 2001 Quinquennial Reviews.

OO2. To meet the Government's requirements and targets concerning freedom of information, e-business, (including electronic records management), the modernisation of public services and the promotion of racial and gender equality of opportunity.

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[7] *Creating knowledge, creating wealth: realising the potential of public sector research establishments* – a report by John Baker to the Minister for Science and the Financial Secretary to the Treasury; *August 1999.*

[8] *Delivering the Commercialisation of Public Sector Science,* Report by the Comptroller and Auditor General, HC 580 Session 2001-2002, 8 February 2002.

OO3. To have established the systems to support a co-ordinated performance management system for the Science Budget and the Research Councils in time for the next spending review.

Monitoring and Demonstrating Delivery

The nature of science research and research training is such that the final outputs and outcomes of new funding can only be gauged and evaluated after some years. OST's task is to monitor the overall health of the science and engineering base, and to ensure that Science Budget investments have the maximum beneficial impact. OST will continue to lead assessment work looking across the science and engineering base and look to the Research Councils, and others in receipt of Science Budget funding, to continue to make progress in assessing the past, current and likely future impact of their particular investments.
In particular, OST will:

- agree with deliverers a set of appropriate leading indicators of potential future performance and track and report progress against them systematically. These indicators will focus on inputs, processes and intermediate outputs;
- establish output performance baselines for an agreed common set of indicators in the four strategic objective areas against which to report formally. This baseline performance will obviously reflect the outputs and outcomes from previous investments in SR2000, the Comprehensive Spending Review and earlier;
- establish and timetable a programme of evaluations and case studies;
- for new programmes and initiatives launched in the SR2002 period, produce and agree evaluation criteria and a suggested timetable for future evaluations at the start of each programme.

3. University Research Sustainability

The Cross-Cutting Review of Science and Research found convincing evidence that the UK university research base was on an unsustainable trajectory which, if unchecked, would lead to a continued and decisive decline in the capacity and capability of universities to sustain world-class science and engineering research. The review sets out the many reasons which contributed to this, including:

- chronic overtrading in research leading to reliance on internal cross-subsidies from uncertain income sources and a neglect of physical infrastructure;
- a lack of clarity at the heart of the Dual Support system about the purposes for which Funding Council support for research was intended;
- a gradual but sustained shift in the balance between the two sides of the Dual Support system; and
- a substantial increase over the previous decade in the volume of research being performed which was funded at less than full economic cost.

Investing in Innovation sets out the Government's agenda for tackling this situation. This includes two specific actions which come under the umbrella of the Science Budget: investment in university science research infrastructure; and an increase from 2005-06 in the amount that Research Councils contribute to the overall costs of university research.

University science research infrastructure

A modern and well maintained capital infrastructure in universities is important to the health of scientific research in the UK because:

- the quality and age of the facilities and equipment increasingly determine the quality of the science that an institution can do. Failure to invest will progressively put the UK at a competitive disadvantage given the increasing importance of infrastructure to modern science; and
- universities with older laboratories and outdated equipment will find it increasingly difficult to attract and retain the best research talent in what is now a global market for science research.

Building on investment totalling £1.75 billion in the 1998 and 2000 spending reviews (jointly funded by the Government and the Wellcome Trust), the Government has created a dedicated capital funding stream worth £500 million per year from 2004–05 to tackle the effects of under-investment in research infrastructure. Of this, £300 million will be provided by the Science Budget on a UK-wide basis and £200 million will be provided by DfES on an England-only basis. Additional funding may be made available by the devolved administrations.

Table 3: University science research infrastructure funding 1999–2000 to 2005–06

£ million	1999–00	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06
	Joint Infrastructure Fund			SRIF[1]		SRIF2	
OST	50	125	125	125	250	300	300
DfES	25	50	75	150	150	200	200
Wellcome Trust	50	125	125	75	150	–	–
Total	**125**	**300**	**325**	**350**	**550**	**500**	**500**

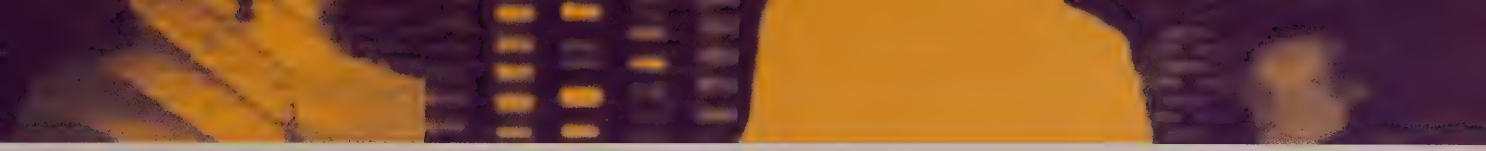
(1) Does not include the £50 million per year that was dedicated to Research Councils' capital requirements.

The Joint Infrastructure Fund (JIF) and the Science Research Investment Fund (SRIF) have been successful in increasing investment in research infrastructure. However, SRIF finishes at the end of 2003–04 and so does not provide the certainty that universities require to enable them to plan their medium and longer-term investments sensibly. Under SRIF, universities are required to find 25 per cent of the costs of projects from other sources, with an exemption for joint university projects which are genuinely collaborative. The thinking behind this requirement was that it would force universities to seek other funds and focus on their real priorities. In practice, while these aims have been achieved, many universities have found it difficult to raise such large sums.
The Government has therefore concluded that the level should in future be set at 10 per cent and that the waiver for collaborative projects should stand.

The now dedicated capital funding line ("SRIF2") will be distributed, as SRIF has been, on the basis of a formula driven by research excellence and volume. Universities will draw down their allocations on condition that they can demonstrate a sound research infrastructure investment strategy. Within that strategy, it will be for each university to determine for itself the investment mix which best matches its medium and long-term needs, taking account of the strategic priorities of the Research Councils and other funders of the science and engineering base. It is expected that the allocation of this funding will be announced in January 2003.

A small element of the new dedicated capital stream will be retained centrally to provide a measure of support for strategic rationalisation and restructuring of the university science base on a responsive basis. Funds will be made available only where it can be demonstrated that rationalising and restructuring will produce a critical mass of international research excellence that could not be achieved by the institutions using their individual capital funding allocations. This funding will support only the research element of any rationalisation and restructuring; any teaching or other benefits will need to be funded from other relevant sources.

Under SRIF, a separate capital stream of £50 million per year was earmarked for the modernisation of Research Council institutes, centres and surveys and the development of large national science research facilities.
This line of funding will continue separately from SRIF2; it is described in more detail in Chapter 7.



Dual Support Reform

The Science Budget includes £120 million per year from 2005–06 which will be used to enable the Research Councils to pay a larger contribution than at present to the full economic costs of research in universities. As noted above, a lack of clarity at the heart of the Dual Support system along with a gradual but sustained change in the balance between the two arms of the system have contributed significantly to the problems of the sustainability of the university research base. *Investing in Innovation* notes that if the problems of the sector are to be put right an important factor will be that full costs of research will have to be recovered by universities. In practice this means that prices will have to rise for all funders of research. This £120 million will enable the Research Councils to pay higher prices without reducing the volume of research that they fund. But there are complex issues to be resolved before it will be apparent how the £120 million should be used to maximum effect. To this end, OST is looking at how best to implement this reform to the Dual Support system, in collaboration with the DfES, HEFCE and other key stakeholders.

4. Knowledge Transfer from the Science and Engineering Base

Knowledge transfer is a key element supporting the strategy for Investing in Innovation. Investment in research provides much of the foundation for innovation and the new products and services that result. Such exploitation depends on the transfer of knowledge and skills between universities, other research organisations and businesses. The UK does not have a good track record of producing commercially successful new products and services compared with our competitors. It is imperative that, as we renew the science base, enhance the flow of skilled scientists, and invest in further growth for new science, we ensure there are effective two-way links between research and the market.

Higher Education Innovation Fund (HEIF)

Investing in Innovation makes clear that the Government will consolidate HEIF as a permanent third stream of funding for universities, with investment rising to £90 million per year by 2005–06. This will provide pump-priming resources for technology transfer, entrepreneurship training, and seed funding for commercial ventures. The new consolidated HEIF, jointly managed by OST and HEFCE will include support for activities previously funded under University Challenge (UC), and Science Enterprise Challenge (SEC) to support knowledge transfer through a single stream of funding. £170 million will be allocated to universities through a single bidding round to cover the periods 2004–05 and 2005–06.

HEIF is not exclusively for science related knowledge transfer and will provide greater flexibility to back a range of proposals from universities. HEIF will have two broad priorities in the period 2004–05 and 2005–06:

- to back success which has been demonstrated so far in knowledge transfer achievements including through skilful deployment of earlier rounds of funding;
- to broaden the reach of knowledge transfer activities through support for non-research intensive university departments, working in partnership with others to engage Small and Medium Sized Enterprises (SMEs) and less technologically sophisticated businesses in stimulating innovation through links with the university knowledge base.

The Regional Development Agencies (RDAs) will play an enhanced role in helping to ensure that resources from HEIF contribute most effectively to regional growth strategies. This may include where appropriate co-funding proposals and ensuring that university proposals are relevant and proportionate to the needs of industry.

Public Sector Research Establishment Fund (PSRE Fund)

The settlement provides for £15 million over 2 years for a second round of the PSRE Fund to support the continued growth in commercialisation activity from PSREs. This will increase by 50 per cent the amount of funding devoted centrally to knowledge

Table 4: HEIF, 2003–04 to 2005–06

	Baseline	SR2002 allocation		
£ million, resource	2003–04	2003–04	2004–05	2005–06
HEIF	50.000	0.000	10.305	19.425

Table 5: PSRE Fund, 2003–04 to 2005–06

	Baseline	SR2002 allocation		
£ million, resource	2003–04	2003–04	2004–05	2005–06
PSRE Fund	0.000	0.000	4.655	9.715

transfer from PSREs since the last spending review. This recognizes the opportunities that exist, and the significant potential that these organisations hold.

Funding for knowledge transfer from PSREs is in part a response to the Baker Report on realising the economic potential of PSREs. Awards totalling £10 million were made in October 2001 to 15 institutions and 10 lead NHS Trusts to build capacity in PSREs so that they can develop better relationships with industry, create networks and exploit intellectual property. In addition, the PSRE fund has provided seed funding to support the very early stages of business formation from ideas emerging out of research in the public sector science base. These awards are being monitored on the basis of annual reports.

Details on the process for allocating the new funding to support commercialisation in PSREs, and the second round of HEIF will be announced in 2003.

Success criteria

Universities and PSREs including Research Council institutes will have to propose measures by which their progress and success can be judged. These measures should over time provide a basis for establishing measures to ensure that this money increasingly follows success.

Increased exploitation and knowledge transfer from the Science Base will also be judged by upward trends in relevant indicators drawn from those listed in the technical notes to DTI's science and innovation PSA targets. The indicators listed in the technical notes are:

- number of patent applications
- number of patents granted
- the number of licensing agreements
- income from licensing intellectual property
- number of spin-outs
- business representation on governing bodies
- income from business
- full-time equivalent staff employed in commercialisation, and industrial liaison offices
- number of science and engineering students (undergraduate and postgraduate) receiving enterprise training
- publication and patents jointly authored between science base and industry.

5. People in the Science and Engineering Base

Research Careers: Roberts Review

The UK's research and development (R&D) and innovation performance is critically dependent on a strong supply of highly skilled scientists and engineers. In the spending review settlement for the Science Budget, the Government has provided £100 million per year from 2005–06 to implement the key recommendations of Sir Gareth Roberts' review of the supply of scientists and engineers with regard to improving significantly the pay and training offered to Research Council funded PhD students and postdoctoral researchers.

Improving the attractiveness of scientific PhDs

Postgraduate study is fundamental to the development of the highest level of science and engineering skills. It develops specialist knowledge and, particularly at the PhD level, teaches and develops students in the techniques and methods of scientific research. With the increasing sophistication of R&D activity, the majority of the UK's future scientific researchers need to have postgraduate qualifications. If UK universities and businesses are to undertake the cutting-edge research necessary to lift the UK's innovation performance, they need to work with Government to ensure that the most able undergraduate scientists are attracted to postgraduate study. To achieve this, two sets of issues need to be addressed:

- the immediate attractiveness of a PhD compared to other options; and
- the opportunities that become available as a result of gaining a PhD.

The Roberts Review identified various features of science and engineering PhDs that are deterring able students, and concluded that two in particular should be addressed:

- the level of the PhD stipend and that many PhDs continue beyond the time for which funding is available; and
- the nature of a PhD in the UK and how far it confers the balance of skills required to conduct high quality R&D and a successful career in business.

Since 1998, the Government has raised the level of Research Council PhD stipends significantly, from under £5,500 to a planned £9,000 in 2003–04. Despite these rises, PhD stipends remain far below what able graduates can earn elsewhere: the mean post-tax graduate salary expected for a first job in 2000 was over £12,000. In an increasingly competitive labour market, where there is a premium on the most talented, the Government has accepted that PhD stipends must rise further. As announced in *Investing In Innovation,* the minimum Research Council PhD stipend will rise from £8000 in this academic year to £9000 in 2003–04, £10,500 in 2004–05 and to £12,000 a year by 2005–06. Funds for this have been included in the allocations to the Research Councils set out in Chapter 6 of this booklet.

As part of this spending review settlement the Government has also provided funds to allow higher stipends in subjects with particular recruitment difficulties. It is intended that in those areas with recruitment difficulties this funding will allow the average PhD stipend to increase to over £13,000 by 2005–06. The additional funds for this are yet to be allocated. Work will start soon to identify the disciplines to be targeted.

Students and employers need to know that a science PhD will equip students with the skills relevant to their future careers. In many areas over half of PhD graduates go directly into jobs in business. It is essential that their skill base is relevant to that environment as well as to university and public sector employment. The Roberts Review concluded that currently PhD programmes do not deliver the quality of training required by industry. The most significant weakness is in the level of training provided in transferable skills, such as management and project planning.

The allocation of funds to enhance the transferable skills for PhD students is £2 million in financial year 2003–04, £5.5 million in financial year 2004–05 and £9.5 million in financial year 2005–06.

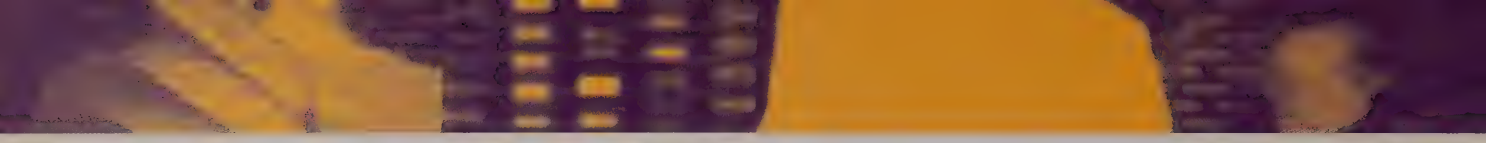
Ensuring Postdoctoral Research is Attractive to the Best PhD Graduates

A third of PhD graduates in the UK go on to spend time as postdoctoral researchers where they learn how to develop and run research projects – skills that are vital as academic staff or researchers in the private sector. The position of postdoctoral researcher is unattractive to many PhD graduates. The Roberts Review identified poor pay and conditions, including short-term contracts that rarely provide security beyond the current project, as particular problems.

There is increasing differentiation of salaries at senior levels in the science and engineering base to reflect market forces. However, universities report significantly less variation in pay amongst junior and middle-ranking academic staff. Instead, many appear to be promoting staff early to professorships and other senior posts, or offering research staff other incentives such as fewer teaching hours. Such approaches can be effective in attracting and retaining individuals. However, they are less visible to those considering careers in scientific research and are therefore less effective (compared to more visible and explicit salary increases) in promoting careers in those areas where competitive pressures are greatest.

To address these issues, the Government provided funds in the recent spending review to address the relevant recommendations from the Roberts Review:

- **increase the average Research Council postdoctoral salary by around £4,000 by 2005–06.** As with the average PhD stipend, increases in postdoctoral salary are to be aimed at areas of recruitment difficulty and will reflect labour market pressures. The additional funds for increasing the Research Councils' postdoctoral salaries have not yet been allocated. Work will start soon to identify the areas of recruitment difficulty and labour market pressures.
- **improve the training opportunities available to postdoctoral researchers.** The allocation of funds to enhance the transferable skills for postdoctoral researcher



is £1.5 million in financial year 2003–04, £4 million in financial year 2004–05 and £7.5 million in financial year 2005–06.

- **create 1,000 new academic fellowships over five years to provide more stable and attractive routes into academia.** The additional funds for academic fellowships have not yet been allocated. Further details will be announced as part of the review of the Dual Support System which will report next year.

Taken together, the changes above will encourage more of the best scientists at undergraduate level to continue their studies and pursue careers in research and development in both the private and public sectors in the UK.

6. Science and Engineering Research: Allocations to the Research Councils and Other Funded Bodies

Introduction: Basis of the Allocations to the Research Councils

This chapter describes the allocation of Science Budget to the Research Councils for the period 2003–04 to 2005–06 for new science, engineering and technology research. It describes the main multi-Council research programmes which will be funded during this period and provides an overview for each Council of how the new resources will be deployed in pursuit of the Science Budget objectives described in Chapter 2.

The allocations reflect advice put to the Director General of Research Councils by the Research Councils' UK Strategy Group, which comprises the Chief Executives of all the Councils, chaired by DGRC. The Research Councils – individually and collectively – have, since the spring of 2001, been actively involved in generating and prioritising proposals for important new areas of research. In doing so, they have involved their research and user communities extensively. Following the announcement of the spending review in July 2002, the RCUK Strategy Group met during the autumn to discuss its advice to DGRC. It was agreed that, in line with the recommendations of the Quinquennial Review of the Research Councils, and with the objectives described in Chapter 2, decisions on investing new money in science research should be judged on the extent to which such investments would:

- build on key strengths or address critical weaknesses in the UK SEB
- address longer-term UK economic or social needs
- produce results that the UK will successfully be able to exploit
- produce highly trained people with relevant skills
- address specific and time-limited scientific opportunities which have a reasonable probability of success.

In addition, it was agreed that allocations to Research Councils should reflect the scope for partnership and leverage in proposed new research programmes and the extent to which Councils were willing and able to withdraw from lower priority areas of research and hence free up funds for redeployment to new, higher priorities. An underlying criterion is that all new funding should continue to be directed only to the most excellent science.

With these criteria in mind and following a period in which the majority of new funding for science research had been earmarked for specific new cross-Council programmes it was concluded that considerable emphasis needed to be placed on expanding Councils' existing core research programmes ("uplift"). As a result, the allocation of the new science funding features both funding for further new top-priority multi-Council research programmes and simple uplift to Councils' existing budgets which is, to a high degree, available to be deployed at Councils' own discretion. It has not been possible to fund all the excellent new programmes which were proposed, but in some

cases, partial funding has been provided from the new money available, with the intention that Councils will supplement this by withdrawing from lower priority areas of research and seeking collaborative funding from other sources.

The tables shown later in the chapter for each Research Council contain:

- all the new money that each Council will receive for new science, engineering and technology research, whether as part of a multi-Council programme or as uplift;
- the money that is being allocated now for the implementation of the Roberts Review (see Chapter 5); and
- the first tranche of capital that is being released now for investment in Research Council institutes' infrastructure refurbishment and renewal (see Chapter 7).

Top Priority Programmes 2003–04 to 2005–06

Stem cells

Strategic purpose

The United Kingdom recently became the first country in the world to approve properly conducted research into the use of human embryonic stem cells. This provides a window of opportunit to grasp the potential of stem cell based therapies.

Stem cells have the unique capacity to renew themselves and give rise to other specialised cell types; they therefore have the potential to repair or replace tissues and organs damaged by disease or disability, such as in Parkinson's disease and diabetes. Stem cells may be derived from embryos, some foetal tissues and also from adults. Whilst the latter obviate the ethical concerns that attach to embryonic stem cells, they are rarer and more difficult to work with. Until these problems are resolved, research must be conducted on both in parallel.

Programme outline

The programme builds on a strong research base and specific investments which the Research Councils have made in this area from their baselines over the last few years. In particular, MRC and BBSRC have agreed to set up the £2.6 million UK Stem Cell Bank at the National Institute for Biological Standards and Control (NIBSC). The establishment of the bank will ensure that there is a single national independent centre responsible for managing and supplying ethically approved, quality-controlled stem cell 'lines' for research.

Table 6: Stem cells

£ million, resource	2003–04	2004–05	2005–06	Total
MRC	0.000	6.000	20.000	26.000
BBSRC	0.000	2.450	8.150	10.600
EPSRC	0.000	0.280	0.920	1.200
ESRC	0.000	0.420	1.380	1.800
CLRC	0.000	0.100	0.300	0.400
Total	**0.000**	**9.250**	**30.750**	**40.000**

The bank will hold existing and new adult, foetal and embryonic stem cell lines.

With the £40 million provided under the settlement, the Research Councils will undertake a concerted programme of multidisciplinary research that takes advantage of recent major conceptual and technical advances. Basic research will generate new insights into fundamental stem cell biology and developmental processes, while more applied research will work towards new treatments for major diseases and disabilities. Physical sciences research will support the development of methods to follow the fate of grafted cells and their function. Social sciences research will explore issues of public confidence, regulation and innovation. Phase I of the national stem cell bank will underpin these endeavours; this will curate and distribute validated human cell lines that can, in the longer term, be used to treat patients. Phase II of the bank will further develop capacity in "Good Manufacturing Practice".

Research outcomes

Through this initiative the UK will be at the forefront of the international and commercial developments likely to flow from stem cell research; UK companies and international agencies are already enquiring about collaborative opportunities. The UK will also lead on the social and economic implications of the research.

In the short term, there will be increased support to excellent scientists in the UK and the possibility of attracting further researchers from overseas. In the medium term, more knowledge will be gained about the capacity of stem cells to develop into different types of body cell, and their ability to function normally. In the longer term, probably beyond 2006, preliminary studies of treatment will be undertaken in humans. Ultimately, a variety of new treatments may be developed, and new products may also generate income for the academic base and companies.

Towards a Sustainable Energy Economy

Strategic purpose

Over the next three generations, fossil fuel reserves will decline while it is estimated that world energy demands are likely to increase as a result of increasing population and economic growth. The Intergovernmental Panel on Climate Change predicts, over the same period, significant increases in global temperatures as a result of increased CO_2 and other greenhouse gas emissions.

Table 7: Towards a Sustainable Energy Economy

£ million, resource	2003–04	2004–05	2005–06	Total
NERC	0.000	1.850	6.150	8.000
EPSRC total, *of which:*	2.000	4.620	8.380	15.000
PIU energy	*2.000*	*3.000*	*3.000*	*8.000*
ESRC	0.000	1.150	3.850	5.000
Total	**2.000**	**7.620**	**18.380**	**28.000**

The challenges facing the UK and the rest of the world are how to meet the predicted energy gap, while providing a secure and affordable supply of energy, and at the same time minimising CO_2 emissions and contributing to sustainable development. The Cabinet Office Performance and Innovation Unit's (PIU) Energy Review also identified these issues as requiring urgent attention. The Government is shortly to publish a White Paper on energy.

Programme outline

Working together, and with other partners, the Research Councils will make a major new investment in sustainable energy research to address the significant technological, social, political, economic and environmental uncertainties, challenges and opportunities.

The Sustainable Energy Economy research programme will draw on existing strengths and investments, build capacity and enable the UK to accelerate existing areas of research and training. Creation of an Energy Research Network will provide the means of establishing interdisciplinary teams with expertise in the scientific, technological, social, economic, environmental and health aspects of energy, providing much needed co-ordination and cohesion. A new UK Energy Research Centre will be established and will act as the hub of the proposed Energy Research Network, working with other bodies and groups in the UK, including the Tyndall Centre for Climate Change Research, the Carbon Trust and DTI.

Research outcomes

The expected outputs and outcomes from this research programme will include:

- creation of an international lead in basic and strategic research on sustainable energy and its impacts;
- a body of underpinning research results to support the development of economically viable and publicly acceptable renewable energy sources and technologies to enable the UK to meet its target for 10% of electricity generation from renewable sources by 2010 and targets beyond;
- an improved interface with business which, together with DTI, the Carbon Trust, other bodies and researchers, can identify and support the development of new products, processes and services with high export potential and opportunities for improvements in the competitiveness of the UK economy;
- an enhanced understanding of the implications of the liberalisation and globalisation of energy markets, technological developments, new energy sources and policy and regulatory frameworks to underpin the Government's strategy for sustainable development.

A total of £20 million is being allocated to the Research Councils for this programme. In addition £8 million has been allocated to EPSRC in response to the PIU Renewable Energy Review, for research that will be co-ordinated with the plans for the Energy Research Network. This is part of an additional £10 million for basic research which has already been announced, and has been funded through the spending review process. The remaining £2 million will be allocated to the Research Councils in 2006–07.

Rural Economy and Land Use

Strategic purpose

Major changes have been occurring in Britain's rural communities. Traditional agriculture is continuing to decline as a source of income and employment. Changes in the use of the land are being driven by significant policy changes at the national and European level, with CAP reform likely to lead to subsidies for environmental and social objectives. There is growing pressure on land for urban development and housing, leisure and tourism and for exploitation of raw materials. At the same time, wider influences such as climate change are impacting on the rural economy, together with the environmental and safety concerns of consumers over intensive farming, the use of GM crops, the demands of key food suppliers and the move to organic farming. Rural communities are subject to major changes in employment opportunities and the depletion of local resources and services.

The Rural White Paper 'Our Countryside: the Future' sets out a vision of a 'living, working, protected and vibrant countryside' encompassing thriving rural communities, a diverse rural economy and a sustainable rural environment.

The Rural Economy and Land Use programme will set out to develop future options for land use and the rural economy which encompass technological change and environmental considerations within conditional futures of socio-political and economic change. It will help to ensure that the vision of the White Paper can be achieved and sustained over the foreseeable future.

Programme outline

The £20 million allocated to the Research Councils will enable them to increase the body of knowledge and understanding from the underpinning science in the following areas:

- economic, environmental and social appraisals of regional land management options
- strategies to promote and support rural regeneration
- modelling and analysis of the environmental impact of alternative land management scenarios
- strategies to underpin "full life cycle" planning of land use
- effective control of animal disease
- improved quality and safety of food products
- improved sustainable primary production
- continued improvement in quality of grassland
- optimised inputs to agricultural production systems
- improved agricultural management.

Table 8: Rural Economy and Land Use

£ million, resource	2003–04	2004–05	2005–06	Total
BBSRC	0.000	1.735	5.765	7.500
NERC	0.000	1.735	5.765	7.500
ESRC	0.000	1.150	3.850	5.000
Total	**0.000**	**4.620**	**15.380**	**20.000**

Research outcomes

The aim of this programme is to provide the body of evidence supported by underpinning research that may be used to inform Government policy in this area. The long-term outcome to which this programme is contributing is achieving a rural economy that meets social and economic objectives, with protection of the rural environment and a modern, sustainable and competitive farming industry. The funding allocated will enable the Research Councils to start to address this agenda.

Continuation or Development of Existing Cross-Council Programmes

e-science

The e-science programme was begun in 2001–02 following the spending review 2000 and is being continued for the present spending review period.

Strategic purpose

The purpose of this programme is to increase the effectiveness and productivity of UK science and engineering by addressing major challenges in the processing, communication, storage and visualisation of increasing amounts of scientific data, allowing global collaboration in key areas of science. It aims to give UK researchers a leading position of excellence in the development and exploitation of Grid technologies, the ability to contribute to the emergence of next generation standards for information utilities, solve problems in individual disciplines, and enable them to compete globally.

Key achievements

The programme has quickly demonstrated the utility of e-science across disciplines in areas ranging from chemistry and biology to astronomy, atmospheric physics, engineering design, materials science and health and medicine. Scientists are engaging with each other in multidisciplinary teams to develop new Grid middleware across many pioneering projects and applications. The programme has seen significant industrial commitment, both

Table 9: e-science

£ million, resource	2001–02	2002–03	2003–4	2004–5	2005–6	Total
MRC	1.000	2.000	5.000	6.900	6.200	21.100
BBSRC	1.000	2.000	5.000	5.000	5.000	18.000
NERC	1.000	2.000	4.000	4.000	4.000	15.000
EPSRC of which:	6.000	13.000	22.000	17.200	19.500	77.700
High Performance Computing	*0.000*	*3.000*	*6.000*	*0.000*	*2.500*	*11.500*
Core e-science programme	*3.000*	*6.000*	*6.000*	*8.200*	*8.000*	*31.200*
PPARC	3.000	8.000	15.000	16.400	15.200	57.600
ESRC	0.000	1.000	2.000	5.500	5.100	13.600
CLRC	1.000	1.500	2.500	2.500	2.500	10.000
Total	**13.000**	**29.500**	**55.500**	**57.500**	**57.500**	**213.000**

from international IT companies and from major companies in the engineering and pharmaceutical sectors. The UK e-science research community has also become significantly involved in major EU and other international programmes, including world standards bodies, as well as developing a focused long-term research agenda in computing, essential for maintaining the UK's leading position in future Grid applications. The establishment of a national e-science Institute is acting as a focal point for activity engaging with international experts and ensuring that the highest academic excellence, standards and expertise in the UK are maintained.

Research outcomes and objectives

OST will provide £115 million over two years to extend the work started in the spending review 2000 (£98 million over 3 years), enabling the programme to:

- solve major research challenges in processing, communication and storage of very large volumes of valuable data;
- provide generic solutions to needs of individual disciplines and applications;
- establish best practice across disciplines;
- provide infrastructure and facilities needed for next major stages of international collaborative research; and
- build on the leading international role established following the spending review 2000.

EPSRC will continue to have responsibility for the e-science Core Programme on behalf of all the Research Councils. The Core Programme will continue the development of generic middleware and support infrastructure for the science pilot applications. The Core Programme will act as a focus for UK activities and partnerships with other countries, and will ensure dissemination of best practice amongst the applications.

In addition £2.5 million will be provided for future high performance computing services for EPSRC and other Research Councils, ensuring existing and future national UK

Table 10: Post-genomics and proteomics

£ million, resource	2001–02	2002–03	2003–4	2004–5	2005–6	Total
MRC(1)	9.000	20.000	24.000	25.440	28.810	107.250
BBSRC	3.000	11.000	19.000	21.550	27.500	82.050
NERC	0.000	2.000	4.000	4.920	7.055	17.975
EPSRC	2.000	5.000	6.000	6.830	8.745	28.575
ESRC	1.000	1.500	2.500	2.500	2.500	10.000
CLRC	0.000	0.000	0.000	0.030	0.120	0.150
Total	**15.000**	**39.500**	**55.500**	**61.270**	**74.730**	**246.000**

(1) In addition, MRC have a £2 million per annum capital allocation.

high performance computing services will be available over the Grid.

Post-genomics and proteomics

The genomics programme was begun in 2001–02 following the previous spending review. It is being continued following the spending review 2002 and expanded to include new research into proteomics.

Strategic purpose

The purpose of the programme is to enhance UK capability in genomics and proteomics that will underpin the translation of post-genome research into improved health and economic outcomes. Proteomics is the study of where each protein is located in the cell, when the protein is present and for how long, and with which other proteins it is interacting. Genomics focuses on the analysis of the genetic material (the genome), which is a stable entity and identical in virtually all cells in an organism, whereas proteomics focuses on the changes that occur in the proteins expressed. Accurate assessment of these proteins and their changes over time is essential in order to relate information about the genome into understanding of, and the ability to manipulate, the function of cells. The potential applications within medicine and healthcare, agriculture, biomanufacturing and the environment, are enormous.

Key achievements

The Research Councils' post-genomics programme has, to date:

- established nationally-co-ordinated centres of internationally competitive research excellence in genomics of key model and target organisms;
- developed strong UK capability in micro array-based transcriptome studies through the provision of technology and bioinformatics support;
- developed extensive DNA collections to support post-genomic studies in model and target organisms;
- achieved significant increases in the UK skill base and technical capability in arraying, bioinformatics and other key post-genomic technologies;
- developed extensive collaboration between the research base and UK industry through, for example, the Exploiting Genomics Initiative and the Applied Genomics LINK programme;
- begun extensive programmes to apply post-genomic approaches to environmental research;
- developed understanding of the social and ethical impacts of developing genomics technologies.

The cross-Council Genomics Co-ordination Committee has successfully co-ordinated the post-genomics programme across the participating Councils, as well as operating effective interfaces with industry, charities and Government Departments. This Committee will continue to co-ordinate the extended post-genomics and proteomics programme.

Programme outline of new funding

Each Council listed in the table will have a contribution to make to an integrated approach, addressing the key areas of:

- **protein structure** and predictive modelling;

- **protein function**, including the understanding of protein interactions, pathways, and complexes;
- **regulation, modification and expression**, which is heavily dependent on high throughput identification of proteins and their properties;
- **integrative post-genomic science** combining proteomic and genomic data with e.g. studies on model organisms or human populations;
- **bioinformatics**, which provides data mining and predictive tools and enables integration and comparison of research findings;
- **technology development and provision of key facilities and tools** for research and to underpin development of the industrial base.

Research outcomes

Increased capability in proteomics forms a key part of the next phase of the long term Research Council strategy to translate post-genomic knowledge into UK health and wealth. Realisation of the potential of this area requires significant investment in high throughput instrumentation for protein identification and purification, advanced data handling and the development of a cadre of highly skilled staff capable of working on the development and use of these techniques within cross disciplinary teams.

This additional investment by the Research Councils will accelerate the application of the output from that already made in post-genomics to the development of drugs and diagnostics, manufacturing processes and materials and sustainable rural development. International competitive strength in this area can be maintained by building on the world lead in informatics and modelling which has kept UK structural biology at the forefront; by exploiting the national centres established for the genomics of model organisms and for the human population and for structural biology; and by focusing on areas of UK scientific strength e.g. membranes, cell signalling pathways and stem cells. The development of a national informatics structure for proteome and protein data will be essential.

Basic Technology

The basic technology programme, begun following the previous spending review, is being continued and expanded in 2004–05 and 2005–06.

Table 11: Basic Technology

£ million, resource	2001–02	2002–03	2003–4	2004–5	2005–6	Total
EPSRC (funds held on behalf of all councils)	2.000	14.000	25.000	27.300	32.700	101.000
ESRC	0.000	1.000	2.000	0.000	0.000	3.000
Total	**2.000**	**15.000**	**27.000**	**27.300**	**32.700**	**104.000**

Strategic purpose

The purpose of the programme is to increase the capability of the UK to capitalise on the development of technologies that could lead to new businesses, processes and products. The programme is contributing to the development of a generic technology base that can be adapted to a diverse range of scientific research problems and challenges spanning the interests of all the Research Councils.

The programme is helping to develop a UK technology research capability that will change the way we do science and underpin the industrial base of the future. It is ambitious and is prepared to take risks to maximise the opportunities for genuine leaps in technology. It will continue to invest at new scientific interfaces and will not be constrained by standard disciplinary divisions. It will nevertheless seek to provide a span of new technological capabilities recognised as important over the broad spectrum of research. The programme will seek to harness the progress in fundamental scientific understanding in a way that opens up a whole variety of practical applications to underpin the next generation of tools, techniques, processes and systems that will impact on our research, our industries and our lives in the future.

Key Achievements

The programme has, to date, already stimulated more than 400 research ideas from across the research community. The supply of top-quality, exciting proposals has far outstripped the funding available. Research groups have achieved success through forging multi-disciplinary partnerships to take cutting-edge technology to the next level.

Innovations in fundamental technologies are being driven forward covering such diverse areas as terahertz imaging, femtosecond X-ray nanoprobes, quantum control of individual atoms and building vision machines that mimic the human eye. All have wide impact. For example, terahertz imaging will allow us to read books without opening them, look for buried objects in the ground, or look at tumours and allow us to tell the difference between healthy and malignant cells non-invasively. Femtosecond X-ray nanoprobes go beyond conventional X-ray crystallography. Not everything can be crystallised, so this technique will allow researchers to look at the gas phase, at surface structure, into water droplets and has applicability from pharmacology to materials science.

Work on sensing electric fields from a distance without contact will enable the detection of vibrations across a huge scale range from earthquake tremors, to low frequency vibrations in the body related to pain.

The research implications transcend the disciplines and research teams have to work through and beyond their disciplines. Indeed, in this programme, the discipline is considered an artificial boundary, and irrelevant in the pursuit of technology development.

Programme outline for new funding

In taking the programme forward, in addition to annual calls for highly-innovative projects, four new important requirements are being introduced:

- the training of young researchers in bringing multidisciplinary skills to basic technology;

- the introduction of an entrepreneurial culture into the programme so that those undertaking the basic research are alert to opportunities to move new research breakthroughs on to the applied technology research needed to get to market;
- the opportunity to support short "proof of concept" grants so that high risk – potentially high return research proposals can be launched; and
- the engagement of technology champions to work across the research communities to engage the breadth of technology research providers.

Medical Research Council

MRC
Medical Research Council

Table 12: MRC allocations

	Resource				Capital			
	Baseline	SR2002 allocation			Baseline	SR2002 allocation		
£ million	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004-05	2005–06
Total Allocation	411.504	0.480	19.770	58.160	14.557	0.000	8.915	15.195
of which:								
Stem Cells	*0.000*	*0.000*	*6.000*	*20.000*	*0.000*	*0.000*	*0.000*	*0.000*

Strategic direction

The MRC is the UK's principal public funding agency for medical research with the aim of maintaining and improving human health. It will continue to develop a spread of investment across major health issues and disease areas, and to maintain support for centres of excellence which will sustain the UK's international standing in long-term medical research and enable new areas to be tackled promptly. MRC will foster multidisciplinary research in centres and other groupings in order to realise the potential of genomics, proteomics and other research. It will continue to develop related national infrastructure and facilities and increase access to the latest technologies. The Council recognises a special responsibility for attracting the best possible people to basic and applied (including clinical) research, remedying gaps and creating opportunities for talented individuals.

Specific allocations

The MRC will receive a major uplift to its baseline of £38.6 million, to build on existing funding and develop new areas of research in response to its science community.

The MRC will also receive specific allocations in the top priority cross-Council programmes as follows:

Stem cells: MRC are leading the cross-Council programme on stem cells, and have been allocated £26 million in this programme. The Council, jointly with BBSRC, has already led the world in establishing a National Stem Cell Bank – an ethically approved and quality-controlled source of a range of stem cell types. The additional funding will be used to enhance the Stem Cell Bank's longer-term utility for clinical research, build up centres of research excellence elsewhere in the UK, and investigate the social implications of the research and its possible applications.

e-science: The Council has been allocated £13.1 million for the continuing e-science programme. MRC will continue to build on its SR2000 investment in health infomatics, bioinformatics and e-science. It will also use Grid technology to facilitate the design,

management and co-ordination of data from clinical trials. This will enable clinical data to be linked to electronic patient profiles and provide therapeutic information and care options.

Post-genomics and proteomics: The major investment which MRC is making in genomics is being continued and increased. A total of £54.3 million is being allocated to the Council under SR2002. The MRC will use the additional resources from spending review 2002 to maintain the momentum of genomic research, whilst driving forward high through-put approaches, including informatics, to understand protein structure and function. The UK life sciences will be in a stronger position to use the new Diamond light source effectively for X-ray characterisation of proteins.

In addition, MRC will receive £9.7 million support for **brain science** research. Working together with BBSRC, EPSRC and CLRC, MRC will build on existing investments and focus on mental health and neuro-degenerative disease. With the other participating Councils, the Health Departments and industry, the Council will aim to build research capacity in basic and translational research, and develop shared resources for the research community.

MRC will receive £8 million to meet its commitments to enhance the PhD stipend in line with the Roberts recommendations and encourage the wider training of postgraduate students and postdoctoral scientists, as described in Chapter 5.

Finally, MRC will receive an initial tranche 1 allocation of £8.9 million for capital investment in institute facilities and equipment, as described in Chapter 7.

Objectives

MRC will continue to:

- develop strategic partnerships in research and research policy, with Government Departments, the NHS, universities and industry – and to enhance synergy with the medical research charities;
- work with the other Research Councils to encourage scientists and engineers from a wide range of disciplines to bring their skills and knowledge to bear on problems in life sciences, and to encourage collaboration between the physical, social and life sciences;
- work pro-actively to transfer knowledge from the research it funds to the development of new vaccines, drugs and other treatments; and
- develop and implement strategies for public engagement in medical research, particularly with a view to encouraging discussion in more sensitive areas such as genetics, stem cells, and the use of animals in research.

Biotechnology and Biological Sciences Research Council (BBSRC)

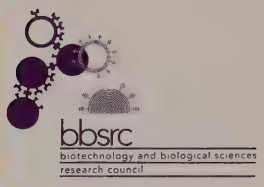


Table 13: BBSRC allocations

	Resource				Capital			
	Baseline	SR2002 allocation			Baseline	SR2002 allocation		
£ million	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004–05	2005–06
Total Allocation	267.262	0.580	17.155	53.935	-2.820(1)	0.000	6.265	10.810
of which:								
Stem Cells	*0.000*	*0.000*	*2.450*	*8.150*	*0.000*	*0.000*	*0.000*	*0.000*
Rural Economy and Land Use	*0.000*	*0.000*	*1.735*	*5.765*	*0.000*	*0.000*	*0.000*	*0.000*

(1) Negative figure results from planned asset disposal in that year.

Strategic direction

BBSRC is the UK's principal public funding agency for basic and strategic research in the non-clinical biosciences. The Council's remit covers all of the microbial, plant and animal kingdoms (including man), and it is the only Research Council with direct responsibility for funding veterinary sciences and research into animal welfare, agriculture and food safety. BBSRC's mission is to fund internationally competitive research, to provide training in the biosciences, to encourage opportunities for knowledge transfer and innovation and to engage the public and other stakeholders in dialogue on issues of scientific interest.

The Council will foster a broad and diverse research base in the UK, and balance that against the need to prioritise certain areas of bioscience that offer particular opportunity for advancing knowledge, providing public good and increasing economic prosperity.

Specific allocations

BBSRC will receive a major uplift to its baseline of £26.1 million, to build on existing funding and develop new areas of research in response to its science community.

In addition, BBSRC will also receive specific allocations in the top priority cross-Council programmes, as follows:

- **Stem cells:** The Council has received an allocation of £10.6 million. This will be used in part to work with MRC to establish the National Stem Cell Bank. It will also be used to increase the size of the research community and the output of high-quality research on basic mechanisms of stem cell propagation, differentiation and associated embryology;
- **Rural Economy and Land Use:** BBSRC will work in partnership ESRC and NERC to develop future options for land use, which harness technological and scientific innovation, within a social and economic

framework. The Council will receive £7.5 million to support basic and strategic research to increase the sustainability of agriculture (including grassland) develop more effective control of animal disease and increase food quality and safety;

- **Post-genomics and proteomics:** BBSRC will receive £49 million to support integrated research on the role of proteins in cell function, bioinformatics and the development of new tools and technology in this area;
- **e-science:** The Council will receive £10 million for e-science, which will focus on the development of software tools, algorithms and analytical methods to help the integration of new and existing data from all levels of biology. Funds will also be available to support courses for training and knowledge transfer to ensure the tools and resources developed are fully utilized in the community.

BBSRC will also receive specific allocations in support of two areas:

Brain science: The Council will receive £4 million to enhance and develop existing activities in the area of neurobiology. With other collaborating Councils (MRC, EPSRC and CLRC) BBSRC will increase the understanding of normal brain function from genes to cells to the function and behaviour of whole organisms;

Infectious diseases of animals: BBSRC-funded science will also benefit from £10 million specifically in this area. This will be used primarily in the fundamental biology of the interactions of a range of infectious organisms with their hosts (viral, bacterial and eukaryotic pathogens) and especially viral persistence, into epidemiology of animal infectious diseases, diagnostics, and into the development of new vaccines. This work will be co-ordinated with that of other funders, particularly DEFRA.

BBSRC will receive £11.24 million to meet its commitments to enhance the PhD stipend in line with the Roberts recommendations and encourage the wider training of postgraduate students and postdoctoral scientists, as described in Chapter 5.

Finally, BBSRC will receive a tranche 1 allocation of £6.8 million for capital investment in institute facilities and equipment, as described in Chapter 7.

Objectives

Key objectives will include:

- to foster a world-class bioscience community in the UK by funding internationally competitive science in relevant and timely areas, and investing in the training and career structure of a highly skilled workforce that meets the needs of employers;
- to enhance innovation and knowledge transfer from the greater research investment in bioscience to increase UK economic prosperity and social benefit;
- to forge new and stronger partnerships with Government Departments, other Research Councils (through RCUK), universities and industry. In particular, to encourage multidisciplinary science;
- to invest in the necessary major facilities, databases, laboratory infrastructure and institutes, in order to provide high quality research facilities in the UK which are conducive to delivering excellent science and which will help to attract and retain the best researchers;
- to continue to develop mechanisms for effective public dialogue.

Natural Environment Research Council (NERC)

NATURAL ENVIRONMENT RESEARCH COUNCIL

Table 14: NERC allocations

	Resource				Capital			
	Baseline	SR2002 allocation			Baseline	SR2002 allocation		
£ million	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004–05	2005–06
Total Allocation	250.589	0.420	10.105	31.530	7.520	0.000	6.450	9.985
of which:								
Sustainable Energy	*0.000*	*0.000*	*1.850*	*6.150*	*0.000*	*0.000*	*0.000*	*0.000*
Rural Economy and Land Use	*0.000*	*0.000*	*1.735*	*5.765*	*0.000*	*0.000*	*0.000*	*0.000*

Strategic direction

NERC will invest in a spectrum of science, ranging from innovative "blue skies" to strategic and applied, including environmental survey and earth observation, as set out in the Council's 5-year strategy (www.nerc.ac.uk/publications/strategicplan/).

Society is facing significant environmental challenges. Recent human impacts have changed many components of the Earth system. NERC are establishing new partnerships across the natural, social science and engineering research base to focus on:

- **earth's life-support systems:** advancing our understanding of the planet by focusing on the interactions within and between the major building blocks of water, biogeochemical cycles and biodiversity;
- **climate change:** accelerating the science NERC already supports to improve our ability to predict climate change and mitigate the impacts;
- **sustainable economies:** helping to identify and provide sustainable solutions to the challenges associated with meeting energy demands, developing effective land use management practices and contributing to natural hazard and disaster mitigation strategies.

Specific allocations

NERC will receive a major uplift to its baseline of £21.5 million, to build on existing funding and develop new areas of research.

In addition, NERC will also receive specific allocations in the top priority cross-Council programmes as follows:

Sustainable Energy Economy: NERC has been allocated £8.0 million as part of this research programme which will enable the UK to access a secure, safe, diverse and reliable energy supply at competitive prices, while meeting the challenge of global warming. Working with others, including EPSRC and ESRC, to establish an Energy Research Centre

to provide a UK focus for research, training and scientific advice in this area.

Rural Economy and Land Use: The Council has been allocated £7.5 million to contribute to this research programme aimed at modelling future scenarios for the rural economy and land use, to help reduce risk and uncertainty and provide policy tools for delivering healthy and sustainable rural economies. NERC will work closely with BBSRC and ESRC and their communities.

e-science: NERC will receive £8 million to continue this programme throughout the period of this spending review. NERC will use e-science to meet the modelling and data assimilation needs of QUEST. QUEST is a new programme which will use an early focus on carbon budget and dynamics to both underpin international negotiations under the Kyoto Protocol and develop a structural framework for addressing science priorities which require an Earth system approach.

Post-Genomics and Proteomics: A further £12 million has been allocated to NERC to continue this programme. Additional investments will be used to improve understanding and exploit knowledge of ecosystems' structure and function, particularly how organisations adapt and respond to a changing environment.

NERC will receive £6 million to meet its commitments to enhance the PhD stipend in line with the Roberts recommendations and encourage the wider training of postgraduate students and postdoctoral scientists, as described in Chapter 5.

NERC will receive a tranche 1 allocation of £7.99 million for capital investment in institute facilities and equipment, as described in Chapter 7.

Finally, subject to satisfactory completion of Gateway reviews, NERC will receive a capital allocation of up to £23.1 million from the large facilities fund (see Chapter 7) towards the cost of a new oceanographic research vessel. This will allow the UK to maintain its lead in internationally competitive scientific programmes aimed at understanding the role of oceans and shallow seas in the functioning of the earth system.

Objectives

Key objectives include:

- to implement NERC's five-year strategy;
- to develop strategic partnerships through involvement in the Environment Research Funders' Forum, RCUK Strategy Group and other fora;
- to invest in NERC Research Centres to ensure that they continue to provide a national capability for research, monitoring, observation, survey and data stewardship;
- to support the best individuals to undertake PhD training in the core disciplines of the environmental sciences; and develop skills in key areas;
- to develop new approaches to knowledge transfer and commercialisation to benefit the UK economy and improve quality of life;
- to enable the public to see how NERC makes decisions and runs its business by holding open meetings, and to develop our work on encouraging public dialogue, including debates on environmental issues.

Engineering and Physical Sciences Research Council (EPSRC)

EPSRC
Engineering and Physical Sciences Research Council

Table 15: EPSRC allocations

	Resource				Capital			
	Baseline	SR2002 allocation			Baseline	SR2002 allocation		
£ million	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004–05	2005–06
Total Allocation	460.269	4.560	22.390	70.395	0.395	0.000	5.360	12.070
of which:								
Sustainable Energy Economy	*0.000*	*2.000*	*4.620*	*8.380*	*0.000*	*0.000*	*0.000*	*0.000*
Stem cells	*0.000*	*0.000*	*0.280*	*0.920*	*0.000*	*0.000*	*0.000*	*0.000*

Strategic direction

EPSRC supports the basic physics, chemistry, materials science, mathematics and computer science at the heart of scientific endeavour and technology development, and also supports research in key application areas in information and communications technology and across the whole of engineering. The link between the engineering and physical sciences and the life sciences is also nurtured. Against this background, EPSRC will aim to support internationally leading research across the continuum of the engineering and physical sciences. It will invest in the capacity of the UK to undertake world-leading research by working with others to attract and retain entrepreneurial and creative people, from students to top researchers, and by increasingly focusing resources. It will preferentially seek out and support research that explores new boundaries, and it will develop a portfolio of research and training relevant to national need, in collaboration with industry and other stakeholders.

Specific allocations

EPSRC will receive a major uplift to its baseline of £26.8 million resource and £17.4 million capital, to build on existing funding and develop new areas of research in response to its science community.

In addition, EPSRC will also receive specific allocations in the top priority cross-Council programmes, as follows:

Stem Cells: The allocation of £1.2 million will be used to help develop the high-resolution instrumentation required to support the Stem Cells programme.

Sustainable Energy Economy: The £15 million allocation will be used to support research into significant technological developments and new energy sources, and to provide an international lead in basic and strategic research on sustainable energy. Part of this allocation (£8 million) is to enhance current investment in research into renewables; whilst £7 million is as part of the co-ordinated activity (with NERC and ESRC) to establish a national energy research network, which will have at its hub a new Energy Research Centre.

Post-Genomics and Proteomics: An additional allocation of £15.6 million will strengthen the contribution that engineering, physics and chemistry can make to post-genomics and life science problems through new analysis techniques and informatics.

e-science: EPSRC will receive a further allocation of £18 million, which will be used to support continuing investment in e-science: in particular to support a programme of underpinning computer science research, together with two further targeted pilot projects, and work on best practice testing. EPSRC will also receive £2.5 million of capital for high performance computing which will contribute towards future requirements that the community is currently considering. Finally, EPSRC will receive £16.2 million to continue to manage the core e-science programme on behalf of all of the Councils (see page 28).

Basic Technology: EPSRC will continue to manage the Basic Technology programme, on behalf of all the Councils (see page 31). It will receive an additional £60 million to continue the programme in 2004–05 and 2005–06.

EPSRC will also receive allocations to support the development of research programmes in the following areas:

New Computational Architectures: The new allocation of £10 million (to be matched from EPSRC's baseline) will be used to develop a strong UK competence in the underpinning understanding and application of emergent, adaptive and hybrid systems. Typical applications could include memory devices and the development of cellular architectures for a new generation of computing systems.

Brain Science: EPSRC will work with BBSRC, MRC and CLRC on a Brain Science programme. The EPSRC allocation of £0.8 million will be used to enhance the current EPSRC investment in high-resolution imaging technology to support this programme.

Fusion: EPSRC has taken over responsibility for the national fusion programme from the DTI Nuclear Industries Directorate. The national programme currently underpins the UK involvement in the Joint European Torus (JET) project (at Culham), and will secure the UK's future involvement in the International Thermonuclear Experimental Reactor (ITER), receiving an allocation of £3 million.

EPSRC will receive £34.3 million to meet its commitments to enhance the PhD stipend in line with the Roberts recommendations and encourage the wider training of postgraduate students and postdoctoral scientists, as described in Chapter 5.

Objectives

Over the period 2003–04 to 2005–06, EPSRC's objectives are to:

- nurture and support internationally leading research, increasingly focusing resources to maximise impact;
- develop strategic partnerships to attract and retain able researchers;
- support exciting research at the boundaries between disciplines, in particular with the life sciences, in collaboration with other Research Councils;
- work closely with partners to promote the transfer of knowledge and skills to industry and other sectors of the economy;
- partner with EPSRC's large community of funded researchers to enable them to engage effectively with schools and the public.

Particle Physics and Astronomy Research Council (PPARC)

PPARC

Table 16: PPARC allocations

	Resource				Capital			
	Baseline	SR2002 allocation			Baseline	SR2002 allocation		
£ million	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004-05	2005–06
Total Allocation	248.780	0.190	10.210	25.220	1.800	0.000	5.680	9.440

Strategic direction

PPARC is the UK's funding agency for the advancement of particle physics and astronomy. PPARC-funded research tackles fundamental questions at the smallest and largest scale – What are the basic properties and forces of matter? What is the origin of the Universe and how has it evolved? What constitutes the missing mass of the Universe? Has life existed elsewhere in the Universe? PPARC's role is to provide UK researchers with access to world-leading facilities and ensure that UK universities have sufficient effort and infrastructure to exploit these facilities. It supports the training of highly skilled manpower for the research base, industry and commerce, and develops new technologies which have wider applicability in industry and the health sector.

Specific allocations

PPARC will receive a major uplift to its baseline of £24.8 million, to build on existing funding and develop new areas of research in response to its science community.

In addition, PPARC will also receive specific allocations as follows:

e-science: PPARC will receive a further £31.6 million to continue this programme throughout the period of this spending review. Its objectives will be to create a UK Particle Physics Grid and the computing technologies required for the Large Hadron Collider (LHC) at CERN when it is turned on in 2007; to deliver a working virtual observatory based on key UK astronomical data sets; to place the UK in a leadership position in the international development of Virtual Observatories and in the development of an EU Grid infrastructure.

Accelerator Science: Over the next few years decisions will be made on the funding and construction of several international large accelerator-based facilities. They will include electron linear colliders, re-circulating linear colliders for synchrotron radiation studies and free electron lasers operating across a spectrum of wavelengths.

There is now international consensus within the particle physics community that the next particle physics accelerator should be a Linear Collider. A Linear Collider will not only deliver new opportunities for particle physics to explore beyond the Standard Model, but the associated technology will be key to the future development of synchrotron facilities for other science areas.

PPARC will receive £5.4 million as part of a joint programme with CLRC. The new investment in accelerator science will enable the UK to enhance its high international standing in this field and will position CLRC, universities and industry to win major shares in the construction, and possibly hosting, of major global facilities of strategic importance to the UK science base.

Gravity and Planetary Exploration: PPARC has been allocated an additional £9 million to invest in these two areas. Gravitational Waves will be detected in the next decade. Their detection will enable us to confirm one of the more exotic predictions of Einstein's theory of General Relativity. It will open up a new era in astronomy.

The UK is a world-leader in gravitational physics. The additional investment will position the UK to exploit its technological leadership in the design and deployment of the next generation of large-scale ground-based detectors and the first detector in space, and to lead on data analysis.

There is renewed and growing scientific interest globally in planetary exploration. In Europe, the European Space Agency (ESA) has proposed the AURORA programme with the broad science goals of understanding how planets are formed and evolve, their environments, and the search for life elsewhere in our solar system. The additional investment will enable the UK to shape this programme, and win leadership in missions aligned with its scientific priorities.

PPARC will receive £2.9 million to meet its commitments to enhance the PhD stipend in line with the Roberts recommendations and encourage the wider training of postgraduate students and postdoctoral scientists, as described in Chapter 7.

Objectives

PPARC's main strategic objectives will be to:

- deliver its commitment to the construction of the general-purpose detectors for the LHC at CERN, and the associated grid computing infrastructure;
- exploit its membership of the ESA by winning scientific leadership in selective space science missions aligned with the UK's scientific priorities, and in the provision of international data centres;
- exploit its recent membership of the European Southern Observatory (ESO) and its investment in the Gemini telescopes;
- invest in smaller scale international particle astrophysics experiments, for example, in gravitation wave and neutrino detection, dark matter, and cosmic microwave background radiation;
- strengthen the UK's capability in accelerator science and R&D to position it to participate in the next generation of global accelerators, and, in particular, a Linear Collider and Neutrino Factory;
- invest in blue skies technology R&D, which will underpin longer-term facility development and increase the potential for technology transfer;
- increase provision through grants for infrastructure and exploitation in universities;
- increase the number of research students to enhance the vibrancy of the research base and the throughput of high quality physicists and engineers into industry.

Economic and Social Research Council (ESRC)

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Table 17: ESRC allocations

	Resource				Capital			
	Baseline	SR2002 allocation			Baseline	SR2002 allocation		
£ million	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004-05	2005–06
Total Allocation	93.584	0.400	8.710	23.030	0.600	0.000	1.180	2.650
of which:								
Rural Economy and Land Use	*0.000*	*0.000*	*1.150*	*3.850*	*0.000*	*0.000*	*0.000*	*0.000*
Sustainable Energy Economy	*0.000*	*0.000*	*1.150*	*3.850*	*0.000*	*0.000*	*0.000*	*0.000*
Stem Cells	*0.000*	*0.000*	*0.420*	*1.380*	*0.000*	*0.000*	*0.000*	*0.000*

Strategic direction

Social and economic research provides the basis for our knowledge and understanding of people in all areas of human and social activity. It plays a vital role in addressing issues of major importance to this country and its place in the wider world. ESRC's strategy is to ensure that this contribution is realised through a combination of responsive and strategic funding of research and postgraduate training that is the highest quality and relevant to the development and implementation of policy.

ESRC's seven thematic priorities provide the strategic framework to engage top UK scientists from all social science disciplines in research on key areas of science and policy. Through nation-wide consultations, these priorities are reviewed and updated every 3–4 years. Key priority areas were funded through Spending Review 2000 which ESRC aims to consolidate and build on over the next spending review period.

The delivery of public services is a major policy area of public concern; the last spending review enabled ESRC to establish the Advanced Institute of Management that is focusing on research on management in the UK's private sector. Now it aims to build on this by extending the research programme to cover management in the public services.

One of ESRC's key strategic concerns has been to increase the capacity for high quality research in this country through major initiatives in postgraduate training and methodological research. It will continue to build on these developments through the current spending review by establishing a new state of the art centre to co-ordinate methodological research. It will also be continuing its support for world-class data sets and on e-social science, which are vital resources for social scientists and policy makers.

Specific allocations

ESRC will receive a major uplift to its baseline of £9.7 million, to build on existing funding and develop new areas of research in response to its science community.

In addition, ESRC will also receive specific allocations in the top priority cross-Council programmes, as follows:

Stem Cells: ESRC will receive £1.8 million to establish research into the ethical, regulatory and social aspects of this major new area of biosciences;

Sustainable Energy Economy: ESRC will receive an additional £5 million, and will contribute to particular research into economics and public policy aspects of energy production and supply in the future;

Rural Economy and Land Use: ESRC will receive £5 million as part of this programme, which will examine key aspects of rural enterprise and regeneration, land management and agriculture production. ESRC's primary contribution will be to develop and apply socio-economic expertise and models to inform policy on the development of sustainable rural economies;

Post-Genomics and Proteomics: Under the funding provided from the previous spending review, ESRC set up a network of interdisciplinary centres. These will continue thanks to an additional £5 million from this spending review;

e-science and National Datasets: ESRC will receive £10.6 million to co-ordinate the exploration and embedding of e-science in the social sciences, plus extension of key national datasets;

In addition, ESRC will receive one specific allocation, as follows:

National Methods Co-ordinating Centre: An additional £3 million will be allocated to ESRC to establish the centre which will substantially build on investment in developing techniques and skills of UK's social scientists.

ESRC will receive £8.9 million to meet its commitments to enhance the PhD stipend in line with the Roberts recommendations and encourage the wider training of postgraduate students and postdoctoral scientists, as described in Chapter 5.

Objectives

ESRC's objectives over the spending review period include:

- increasing the highest quality research and research outputs through co-ordinating the cross-Council Programme on Rural Economy and Land Use;
- playing an active part in increasing the UK science capability and competitiveness through participation in the programmes on Sustainable Energy Economy, and Stem Cells;
- continuing to improve the world class standing of UK social science research through establishing the National Methods Co-ordinating Centre;
- consolidating strategic capability in major science areas, including management research and Genomics (through ESRC's genomics research network);
- maintain and build on the spending review investments to deliver excellence in social science research through continued support for data sets.

Council for the Central Laboratory of the Research Councils (CLRC)

Table 18: CLRC allocations

	Resource				Capital			
	Baseline	SR2002 allocation			Baseline	SR2002 allocation		
£ million	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004–05	2005–06
Total Allocation	88.548	7.630	15.100	19.350	19.755	0.000	3.000	3.000
of which:								
Stem Cells	*0.000*	*0.000*	*0.100*	*0.300*	*0.000*	*0.000*	*0.000*	*0.000*

Strategic direction

The CLRC programme covers a broad range of science, engineering and technology including the physical sciences, life sciences, astronomy, Earth observation, space science and technology, particle physics and computational science and engineering, undertaken in collaboration with the other Research Councils. The CLRC plans to sustain and develop its strengths in this critical mass of capabilities.

Under the strategic direction of Research Councils UK, the CLRC also acts as the national focus for large-scale facilities for neutron scattering, synchrotron radiation and high power lasers. From April 2003, the CLRC will advise Government on policies and strategies for access by UK researchers to leading edge research facilities in these and other advanced technology areas, both nationally and internationally.

The CLRC will seek to identify the strategic alignment between the scientific requirements of the UK research communities, the technical options for the continuing development of research facilities and the opportunities for international collaboration.

Following the Quinquennial Review of CLRC, published in April 2002, responsibility for the operation and continued development of the large-scale facilities at the CLRC Daresbury Laboratory and the CLRC Rutherford Appleton Laboratory was passed to the CLRC, together with responsibility for UK subscriptions to the Institut Laue Langevin (ILL) and the European Synchrotron Radiation Facility (ESRF) in Grenoble (see Appendix).

Specific allocations

In addition to the financial transfers described in the appendix, the CLRC has received a major increase to its baseline plus an inflation uplift, which in total amounts to £23.6 million of new funding over the three years. This funding is designed to enable CLRC in its new role to improve the operation of its major facilities and invest in them for the future. It will also enable CLRC to carry out its other new responsibilities following the Quinquennial Review.

In addition to this major increase in baseline, CLRC will also receive specific allocations in the top priority cross-Council programmes, as follows:

Stem Cells: CLRC has received an allocation of £0.4 million to contribute to the cross-Council Stem Cells programme, in areas such as instrumentation.

Post-Genomics and Proteomics: CLRC will receive small-scale provision to enhance its contribution to the cross-Council programme, working with EPSRC and other Councils in areas such as instrumentation

e-science: The Grid is a key technology that will deliver increased scientific productivity across many disciplines from the data being produced by the CLRC its major facilities, including the newly installed HPCx terascale computing system. With the additional £5 million provided, the CLRC will expand the Grid-based facilities it operates for the research community, extend the Grid into new scientific programmes, and embed the Grid into CLRC's core service provision.

CLRC has also received specific allocations in two areas:

ILL Millennium Programme: The Institut Laue Langevin (ILL) in Grenoble is one of the world's leading neutron sources. Neutron scattering makes a unique and fundamental contribution to understanding the structure and dynamics of condensed matter at the microscopic level and ILL is a key facility for UK scientists. CLRC will receive an allocation over three years to invest in a major upgrade of the ILL called the Millennium Programme.

Accelerator Science: CLRC will receive an additional £3.6 million to invest in accelerator science, in a joint programme with PPARC. Together, the Councils will work with the UK academic community, overseas laboratories and industry, to develop further an accelerator science capability within the UK. This will allow contributions to be made to future international frontier projects 'in kind', at a technical level. Possible developments include the linear collider, high-power proton accelerators for a variety of applications including high intensity spallation neutron and neutrino sources, advanced light sources and free electron lasers, as well as underpinning technologies.

Finally, the CLRC will receive a tranche 1 allocation of £12 million for capital investment in institute facilities and equipment, as described in Chapter 7.

Objectives

The CLRC will seek:

- to sustain a highly skilled and effective workforce;
- to maintain CLRC research facilities at the leading edge of international capabilities;
- to establish a network of reinforcing partnerships at the international, national, regional and local levels;
- to develop new technologies and identify new opportunities for science;
- to keep under regular review the evaluation of its critical strengths and the ability of its programmes to remain world class, and to act appropriately;
- to improve the efficiency and effectiveness of CLRC operations;
- to establish an effective link between the CLRC research outputs and the take-up of opportunities for commercial exploitation;
- to strengthen its contribution to the engagement of a wider public on science and engineering programmes.

The Royal Society

THE ROYAL SOCIETY

Purpose of Government Funding

The Royal Society[9] is an independent body, which also acts as the agent of Government undertaking a range of programmes and initiatives. Government funding provides for these specific programmes and initiatives but does not support the full range of the Society's activities.

Specific allocations

Additional resources have been allocated to increase the Royal Society's support for research fellowships and for international exchanges.

The extra funding will enable the Royal Society to introduce a new scheme to support scientists who have to relocate their work, and continue to support the Dorothy Hodgkin Fellowship Scheme which provides flexible four-year grants for researchers. Both schemes are aimed at keeping in science younger postdoctoral researchers who might otherwise leave, for example for family reasons. Increased resources are also being made available for University Research Fellowships, which last for up to ten years.

The additional funds for international exchanges are aimed at enhancing the Royal Society's links with India and China, whose research and researchers are of growing international quality and significance. This should increase the UK's access to the best science and technology in those countries.

OST will be working with the Royal Society to increase the transparency of the administration costs the Society incurs on its publicly-funded schemes.

Table 19: Allocations to the Royal Society

	Baseline	Additions to baseline		
£ million, resource	2003–04	2003–04	2004–05	2005–06
Royal Society	29.245	0	1.800	3.200

[9] The Royal Society – http://www.royalsoc.ac.uk/

The Royal Academy of Engineering

Purpose of Government Funding

The Royal Academy of Engineering[10] is an independent body which, acting as the agent of Government, undertakes a range of programmes and initiatives, mainly people-focused, to encourage links between universities and industry. Government funding provides for these specific programmes and initiatives but does not support the full range of the Academy's activities. However, it enables the Royal Academy of Engineering to attract finance from other sources.

Specific allocations

The additional resources in the allocation will be used across a number of schemes, including Postdoctoral Research Fellowships, with the aim of increasing the leverage of the Academy's publicly-supported research fellowships and chairs.

OST will be working with the Royal Academy of Engineering to increase the transparency of the administration costs that the Academy incurs on its publicly-funded schemes.

Table 20: Allocations to the Royal Academy of Engineering

	Baseline	Additions to baseline		
£ million, resource	2003–04	2003–04	2004–05	2005–06
Royal Academy of Engineering	5.270	0	0.330	0.580

[10] The Royal Academy of Engineering – http://www.raeng.org.uk/

7. Capital Investment in National Science Facilities

Large Scale Experimental Facilities

Our scientists need access to world-class facilities and laboratories if they are to continue to carry out world-class research. In many areas of science this means access to facilities which no one country can afford to build or operate alone. Access to many such facilities is provided through the UK's membership of international organisations some of which are: the European Organisation for Nuclear Research (CERN), the European Space Agency (ESA), and the European Molecular Biology Laboratory. In 2002, the UK also joined the European Southern Observatory (ESO). But there are occasions when it is in the UK's strategic interest to build or to host major facilities in the UK; either on a national or international basis, with the UK taking the lead and other countries contributing. In spending review 2000, the Science Budget was allocated £50 million in each of 2002–03 and 2003–04 for investment in large facilities and Research Council institutes, centres and surveys (see below). The spending review 2002 settlement consolidated that baseline for a further two years, allowing it to become the basis for a longer term plan for investment in large facilities. The plan is derived from the large facilities strategic roadmap (http://www.ost.gov.uk/research/funding/lfroadmap/index.htm), which has been developed with the Research Councils as a framework for planning and implementing the investment programme. A review of this process will be carried out in 2003.

All large capital investments included in the roadmap which have secured funding will be managed as discrete projects and be subject to independent review at key stages in their lifecycle. This is designed to be compatible with the Office of Government Commerce's guidelines for major capital projects embodied in their Gateway process. In order to secure funding a project proposal must progress successfully through the first two key stage reviews: the science case; and the business justification. The RCUK Strategy Group will make funding recommendations at the time when projects reach the appropriate point in this process. That recommendation will be based not only on the outcome of Gateway reviews but also on strategic priorities for the available budget.

The strategic areas currently covered in the roadmap are: synchrotron radiation (and supporting facilities), neutron beams, radioactive particle beams, particle physics, astronomy, oceanographic research vessels and computing infrastructure. The medium term projects currently in the roadmap, some of which secured funding in spending review 2000, include:

- the Diamond synchrotron (separate funding stream – see below);
- a second target station on the ISIS neutron spallation source at the Rutherford Appleton Laboratory (RAL);
- the CASIM 4GLS project at Daresbury Laboratory;
- Diamond research hotels;
- SCUBA 2 telescope instrumentation;

- an oceanographic research vessel to replace the RRS Charles Darwin;
- a replacement building for Laboratory of Molecular Biology;
- and a Muon Ionisation Cooling Device.

The Diamond Synchrotron

Diamond is the name for the new synchrotron radiation facility under construction at the CLRC Rutherford Appleton Laboratory (RAL), which will provide the very high brightness X-ray radiation that physical and bio-scientists need to stay at the forefront of their research fields.

Established as a joint venture between the UK Government and the Wellcome Trust in the spring of this year, the company Diamond Light Source Ltd is now taking the project into the construction phase. CLRC is the UK Government shareholder in the company, owning 86% of the shares. Diamond will be a landmark scientific facility in the UK, with an anticipated total cost over some 25 years from design and construction to de-commissioning in the region of £500 million. The construction programme therefore has a separate funding stream.

The existing capital baseline of £20 million per year will be continued for the spending review 2002 period. This has been supplemented by an additional £110 million over three years, with an extra £13 million resource also set aside to cover the associated increases in capital charges. This will allow the majority of the construction to take place and the first phase of the project, with the machine and the initial beamlines, to be completed during 2006–07.

Research Council Institute Infrastructure

A number of the Councils have institutes, centres and surveys which carry out research and provide services (such as curation) to others also carrying out research.[11] As a rule the institutes, centres and surveys undertake research or other activities which have characteristics (such as scale and duration) which make them unattractive to universities to carry out. There is a need for infrastructure investment to ensure that these institutes remain internationally competitive, with the appropriate equipment in suitably furbished buildings.

In 2001–02, OST sought independent advice on the recurrent level of investment that the Councils should be making to put their institutes, centres and surveys onto a sustainable, long-term footing, and the extent to which Councils were in practice making such investments. Estimated investment gaps of differing sizes were identified among the Councils.

The allocation of capital funding for Research Council institutes, centres and surveys will be made in two tranches. The first tranche, totalling £35 million over two years, will comprise two components as follows:

- £27 million to make good 50% of each Council's recurrent investment gap as identified in the consultant's report; and
- £8 million to be allocated pro-rata to the size of Councils' asset bases on the basis that once the immediate problems are addressed Councils with larger asset bases are likely to have greater investment requirements.

[11] *UK Research Councils Research Institutes* – Department of Trade and Industry, August 2001, *URN 01/1054.*

The allocation for the first tranche is shown below. The second tranche, of up to £35 million, will be made next year, in the light of further work which will be undertaken to validate the asset values within Research Council institutes and to develop robust and sustainable capital investment strategies for their maintenance and renewal.

Table 21: Tranche 1 funding for Research Council instututes infrastructure

	Capital	
£ million	2004–05	2005–06
MRC	4.235	4.665
BBSRC	3.095	3.680
NERC	3.850	4.135
PPARC	2.670	2.670
CLRC	3.000	3.000
Total	**16.85**	**18.15**

8. Science Budget Funds Managed by OST

Science in Society

OST's Science in Society programme provides core funding for the British Association for the Advancement of Science and funds grants for science communication activities through the Copus grants scheme. It also promotes networking and sharing of best practice, for example by funding ECSITE-UK, the network for science and discovery centres.

From 2003–04, in addition to the existing £1.25m annual budget which is set aside for these purposes, a further £1 million per year will be made available among other things to fund the implementation of the recommendations from the science in society study carried out the British Association on behalf of the science communication community, commissioned by OST and published in November 2002. OST will be publishing its response to the BA report and an implementation plan in early 2003.

The funding described here, along with funding provided to the Research Councils and other funded bodies, will be used in support of the Strategic Science and Society Objectives described in Chapter 2.

Promoting Science, Engineering and Technology (SET) for Women

The Promoting SET for Women (PSETW) Unit in OST is working to tackle the under-representation of women in SET by identifying good practice, developing the infrastructure and mainstreaming gender in science policy making. It has a budget of £200,000 per year.

The PSETW Unit compiles and publishes UK gender statistics on education and employment in SET on its website. It is funding a pilot 3-year national mentoring scheme for women in SET whose purpose is to increase the number of women who can remain and progress in their SET careers and are able to return successfully to such careers after a career break. The Unit is working with the Royal Society on the Rosalind Franklin Award which will be open to both men and women who achieve excellence in their area of SET. The Award will consist of a medal and a cash award of £30,000 to be spent on research related activities and promoting SET for women. The Unit will be funding a new pilot of TCS[12] Programmes aimed at SET returners, the bulk of whom are women. The pilot will run in the West Midlands for a 2-year period as an integral part of the national TCS scheme.

Early in 2002, the Secretary of State for Trade and Industry, the Rt Hon Patricia Hewitt, MP appointed Baroness Greenfield to advise on a stronger and more strategic approach to increasing the participation of women in SET. The report will consider UK activity along with overseas activities and identify priorities for more focused action. The report was published on 28 November 2002. The Government welcomes the report and will study it carefully; it will respond in due course.

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[12] Formerly the *Teaching Company Scheme*

International collaborations and subscriptions

The Science and Innovation White Paper (see footnote 5) commits the Government to provide the best framework for scientists and technologists to make international links, including by supporting research collaborations through fostering international links between scientists.

The United Kingdom is party to a number of bilateral S&T Agreements with specific countries which involve the provision of joint support for such collaborative activities. The focus is increasingly on activities in the form of equally shared funding arrangements supporting networking between excellent UK scientists and their counterparts from the specific countries. The objective is to stimulate enduring partnerships, which would then be in a position to bid for project funding through national funding bodies, in accordance with their normal rules, peer review mechanisms and so on. The aim is that in the majority of cases, the networking activities will be facilitated for the UK through the Royal Society and partner governments and scientific institutions in overseas countries. Applicants for networking support will be required to be holders of PhDs or equivalents in the natural sciences and able to demonstrate excellence in their field through recognised indicators. Monitoring and evaluation will be undertaken on the basis of reports to the Royal Society and OST on specific research outputs and outcomes of the activities, including monitoring of papers published and of ongoing co-operation between the scientists concerned.

Provision continues to be made for science-related subscriptions to international multilateral bodies such as COST and IACMST.

Expenditure on international collaborations and on international subscriptions under this heading amounts to £861,000 annually.

Quinquennial Review Implementation

OST will set aside £1 million per year from 2003–04 to provide matching funding to Research Councils which put forward high-quality, innovative, joint proposals for projects aimed at increasing the convergence of their activities, both internally and with respect to the management of customer interfaces, in fulfilment of the recommendations of the Quinquennial Review of the Councils.

Science Budget contingency reserve

It is now standard practice for Government Departments to retain a proportion of their budgets to cover unforeseen developments. Such contingency reserves reduce the pressure on the Government's central reserve. The Science Budget has not, to date, benefited from a contingency reserve; instead, contingencies have been funded from the unused portion of the exchange rate reserve (see below). This source can no longer be relied upon to meet the level of demand that is now being placed upon it and so OST has concluded it is timely to establish a small contingency reserve from April 2003. As a result, £10 million of the SR2002 settlement resource (after budget

re-profiling) has been set aside for this purpose in each of the next three years.

In general, where possible, funds will be drawn down in the form of repayable advances rather than grants and the size of the reserve will be capped at £10 million. Any money in the contingency reserve which is unused in a given year will be available for allocation to high priority areas in the Science Budget the following year.

Exchange rate reserve

Since 1994, OST has maintained a small reserve, recently of £15 million per year, to provide compensation to PPARC in the event of its international subscriptions to CERN and ESA varying adversely as a result of exchange rate movements and changes in net national income.

The recently agreed transfer to NERC and PPARC from BNSC of substantial portions of the UK's subscription to ESA (see Appendix) and the accession of the UK to the European Southern Observatory in July 2002, has given rise to the need to increase the size of the reserve to £25 million from 2004–05. The additional £10 million per year is being funded from the new money provided in SR2002.

The fund will be capped annually at £25 million from 2004–05 onwards and any money which is unused in a given year will be available for allocation to high priority areas in the Science Budget the following year.

OST has agreed with the Research Councils that it will review the operation of this reserve in time for the next spending review.

Research Councils' Pension Scheme

The Research Councils (with the exception of MRC, which has its own fully funded scheme) participate in the Research Councils' Pension Scheme (RCPS), which operates on a pay-as-you-go basis. It takes in predecessor schemes. The RCPS is financed mainly by grant-in-aid from OST and by employers' contributions. The level of employers' contributions is determined by the Government Actuary by comparison with what a funded scheme would require. The current employers' contribution rate is 10.1%. Over the next three years, the Grant-in-Aid element of the scheme rises in line with the number of pensioners in payment to £33.2 million by 2005–06. A new scheme (RCPS 2000) came into force in October 2002 for all new employees. The new scheme is optional for existing employees.

Appendix – changes to Research Councils' baselines

This Appendix explains a series of changes which have been made to Research Councils' baselines before and during the spending review 2002. It is intended to assist the reader to understand the substantial aggregate changes in baselines which have occurred since Science Budget allocations were last published in November 2000.

The changes are summarised in the table at page 51 and explained in more detail in the sections which follow.

Resource Budgeting

Resource Budgeting is being implemented across the whole of Government in two phases. On 1 April 2001 Departmental cash budgets were replaced by resource and capital within the Departmental Expenditure Limit (DEL) and Annually Managed Expenditure (AME). Within these budgets, capital was budgeted for separately and a restriction was placed upon the freedom to transfer from capital into resource expenditure (but not vice versa). Non-cash costs, such as provisions, depreciation and the cost of capital, were placed in AME budgets. The rest of the Science Budget became a DEL budget. AME budgets are monitored but not controlled, whereas DEL budgets are controlled on an annual basis.

From 1 April 2003, all items of Science Budget-related expenditure at present in AME budgets will be transferred to the Science Budget DEL. This means that those items at present in AME budgets will be controlled as part of DEL resource budgets from that date. This is a technical change and Councils' DEL budget baselines have been amended accordingly. From the same date, it will no longer be possible to transfer funds from capital expenditure to resource expenditure. In addition, capital grants to the private sector will no longer score as capital, but as resource.

The general effects on baselines are as follows:

- the baselines of Councils which own significant capital assets (such as institutes, centres and surveys) experience an increase in their resource DEL budgets as capital charges are transferred from AME to resource DEL;
- Councils which make significant levels of capital grants to the private sector (mainly universities) experience falls in their capital budgets, offset by corresponding increases in their resource budgets owing to the reclassification of this type of grant.

Nuclear Fusion Research

This adjustment reflects the transfer from to EPSRC of responsibility for the UK fusion research programme as described in the section on EPSRC in Chapter 6.

CLRC Quinquennial Review

As a consequence of the Quinquennial Review of CLRC funding arrangements have altered from those applying in spending review 2000. CLRC will receive direct funding from the OST from 2003–04 onwards for providing, operating, maintaining, developing and upgrading its large facilities and their instrumentation. This will ensure that the Chief Executive of CLRC, as Accounting Officer, is clearly accountable for the value for money of the delivery of all aspects of access, operation and development of these national facilities.

This involves a transfer of funding to CLRC from Councils whose communities use the facilities provided by CLRC. The basis on which the resulting baseline transfers have been calculated and agreed among the Councils comprises the following:

- 2002–03 service level agreements (SLAs) between CLRC and individual Councils for facility time, uplifted to 2003–04 prices;
- facility development costs based on Councils' previous annual expenditure; and
- the transfer of annual subscription costs for ILL and ESRF from the EPSRC baseline.

No transfers have been made in relation to support infrastructure costs and so SLAs for non-facility work such as particle physics and space science continue to include these costs.

Transfer from EPSRC to BBSRC

These Councils have agreed a transfer of £4.4 million from EPSRC to BBSRC from 1 April 2003 in relation to the funding of research carried out at the interface between the physical and life sciences.

Review of the British National Space Centre

The review of the British National Space Centre (BNSC), published in 2002[13], recommended that some of the responsibilities currently carried out by DTI should be transferred from DTI to the Research Councils together with the necessary funding. This does not form part of the Science Budget allocation, as the transferred money comes from the DTI industry budget settlement for the Spending Review 2002. The result of the transfer will be to increase the baselines of two Research Councils as follows:

- NERC: Increases of £41.3 million, £41.0 million and £41.6 million for 2003–04, 2004–05 and 2005–06 respectively.
- PPARC: Increases of £8.3 million, £8.5 million and £8.7 million for 2003–04, 2004–05 and 2005–06 respectively.

This is a transfer of responsibilities to support existing science commitments. As a result, NERC will be responsible for the UK subscription to those European Space Agency (ESA) programmes which largely focus on earth observation science, namely the Earth Observation Envelope Programme and ENVISAT. PPARC will be fully responsible for paying the UK subscription to the ESA Science Programme. Both Councils, and BNSC, will pay contributions to the ESA General Budget.

[13] Available on the BNSC website, http:www.bnsc.gov.uk

Table 22: Changes to Research Councils' baselines for 2003–04, £ million

	SR2000 provision for 2003–04[3]		Resource Budgeting		Nuclear Fusion	CLRC QQR		EPSRC/ BBSRC transfer	BNSC[2] review	SR2002 Provision for 2003–04	
	Resource	Capital	Resource	Capital	Resource	Resource	Capital	Resource	Resource	Resource	Capital
BBSRC	219.943	27.426	45.838	-30.246		-2.909	0.000	4.400		267.272	-2.820
CLRC[1]	-2.487	12.105	37.905	0.000		55.881	7.650			91.299	19.755
EPSRC[1]	445.129	59.603	64.008	-59.208	17.930	-59.098	0.000	-4.400		463.569	0.395
ESRC	89.363	3.800	4.221	-3.200		0.000	0.000			93.584	0.600
MRC[1]	344.134	38.557	72.048	-24.000		-1.344	0.000			414.838	14.557
NERC[1]	197.930	14.398	58.412	-6.878		-0.180	0.000		41.300	297.462	7.520
PPARC	228.358	9.493	20.422	-7.693		0.000	0.000		8.300	257.080	1.800

(1) These figures include the element of Councils' baselines set aside to provide public expenditure cover for EU receipts. Tables showing Councils' baselines in Chapter 6 do not include this component.

(2) Tables showing Councils' baselines in Chapter 6 do not include the amounts transferred following the BNSC review. This is because a profiled transfer covering each of the three years of the SR2002 period is being made from the BNSC budget in DTI.

(3) These figures take account of a number of other baseline adjustments which took place between the orginal allocation of funds for 2003–04 in SR2000 and the establishment of these figures as the baselines for the spending review 2002.

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